OFF-SITE AREA FINAL ENGINEERED COVER CONSTRUCTION COMPLETION REPORT

AMERICAN CHEMICAL SERVICE, INC.
NPL SITE
GRIFFITH, INDIANA

MWH File No. 2090601

Prepared For:

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ACRONYMS AND ABBREVIATIONS

ACS	American Chemical Service, Inc.
BWES	Barrier Wall Extraction System
CCR	Construction Completion Report
CQAP	Construction Quality Assurance Plan
ECI	Environmental Contractors of Illinois
EW	Extraction Well
FML	Flexible Membrane Liner
Great Lakes	Great Lakes Soil and Environmental
GWTP	Groundwater Treatment Plant
IDEM	Indiana Department of Environmental Management
IEPA	Illinois Environmental Protection Agency
ISVE	In-Situ Vapor Extraction
K&S	K&S Engineers, Inc.
KES	Koester Environmental Services
K-P Area	Kapica-Pazmey Area
MAL	Mid-America Lining
MEI	Midwest Environmental, Inc.
mg/kg	milligrams per kilogram
NPL	National Priority List
OFCA	Off-Site Containment Area
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
ppm	parts per million
PRGs	Preliminary Remediation Goal
psi	pounds per square inch
PSVP	Performance Standard Verification Plan
QC	Quality Control
Region IX	United States Environmental Protection Agency Region IX
RISC	Risk-Integrated System of Closure
SBPA	Still Bottoms Pond Area
SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
TRI	TRI Environmental, Inc.
U.S. EPA	United States Environmental Protection Agency
VFPE	Very Flexible Polyethylene
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This Construction Completion Report (CCR) summarizes the installation of the final engineered cover in the Off-Site Area of the American Chemical Service, Inc. (ACS) National Priorities List (NPL) Site in Griffith, Indiana. The cover was installed during the summer and fall of 2002. The United States Environmental Protection Agency (U.S. EPA) Consent Decree identification number for the final engineered cover is 5.b (Appendix G, Consent Decree).

1.1 OBJECTIVES OF THE OFF-SITE AREA FINAL ENGINEERED COVER

As outlined in the Final Remedial Design Report (Montgomery Watson, August 1999) the main objectives for the Off-Site Area engineered cover are to:

- Eliminate potential direct contact with volatile organic compound (VOC) and polychlorinated biphenyl (PCB)-contaminated soils (and lead-contaminated soils in the Kapica-Pazmey Area [K-P Area]);
- Eliminate potential worker contact with VOC-contaminated groundwater;
- Reduce the potential for contaminant migration to groundwater by reducing infiltration into these areas; and
- Provide a surface seal for the In-Situ Soil Vapor Extraction (ISVE) system to minimize potential short-circuiting and maximize the capture of VOC vapors.

In addition, covering the Off-Site Area reduces the stormwater infiltration into the area inside the barrier wall. This reduces the amount of groundwater that needs to be extracted and treated by the Groundwater Treatment Plant (GWTP) during ISVE implementation and long-term operation of the Barrier Wall Extraction System (BWES).

1.2 OFF-SITE AREA ENGINEERED COVER AREAS

The Off-Site Area was divided into two distinct areas that would each receive a different engineered cover system. The area that contains buried waste to be treated by ISVE is designated as the "Flexible Membrane Liner (FML)" Cover Area. This area includes the Off-Site Containment Area (OFCA) and K-P Area. The cover in this area consists of a 12-inch compacted clay layer and a very flexible polyethylene (VFPE) liner. Twelve inches of root zone, six inches of topsoil, and a vegetative layer were then placed on top of the FML material. The eastern boundary of this area extends slightly farther than shown in the Final Remedial Design Report. The cover was extended approximately 10 to 20 feet to fully cover the regraded wetland pond excavated root zone material pile as required.

The remaining portion of the Off-Site Area that does not contain buried waste is designated as the "Soil Cover Area." This area will not be directly treated by ISVE. The cover for this area consists of 18 inches of compacted clay covered with 6 inches of topsoil and vegetation. The area is not covered with the FML. The boundaries of each of these areas are shown on Figure 1.

1.3 OFF-SITE AREA ENGINEERED COVER INSTALLATION

Two tasks in the Consent Decree deal with the construction of the Off-Site Area Cover: the interim engineered cover (Consent Decree ID 5.a.) and the final cover (Consent Decree ID 5.b.). The installation was divided into these two phases to allow for installation and optimization of the ISVE system before installation of the FML to minimize potential damage to the cover if repairs or modifications to the ISVE were found to be necessary.

The interim engineered cover consists of the initial 12 inches of compacted clay across the Off-Site Area. In the FML Cover area, the final cover consists of a 60-mil VFPE liner on top of the 12 inches of compacted clay, covered by 12 inches of earthen material and six inches of topsoil. The earthen material serves as a root zone to support a healthy root matrix for the overlying vegetative layer planted in the topsoil. In the Soil Cover area (non-ISVE area), the final cover consists of an additional six inches of compacted clay for a total of 18 inches of compacted clay. The clay is covered with vegetative material (grass) to minimize erosion.

This CCR covers primarily the installation of the final engineered cover in the FML Cover Area. The majority of the final cover in the Soil Cover Area (non-ISVE area) was completed during the installation of the interim engineered cover in 2001. While information regarding the final cover installation in the Soil Cover Area is briefly summarized in this report, additional information can be found in the Final Off-Site Area Interim Engineered Cover Construction Completion Report (CCR) (MWH, February 2003).

1.4 REPORT ORGANIZATION

This CCR is organized in the eight sections summarized below:

Section 1: Introduction. This section lists the objectives of the work activities and summarizes the Site history.

Section 2: Relocation of PCB-Impacted Material. This section summarizes the activities involved in moving PCB-impacted material from the Still-Bottom Pond Area (SBPA) and placing it under the clay cover in the FML Cover Area.

Section 3: Final Cover Installation Activities in the FML Cover Area. This section summarizes construction activities involved in installing the final engineered cover in the FML Cover Area.

Section 4: Summary of Final Cover Installation Activities in the Soil Cover Area. This section summarizes the construction activities involved in installing the final cover in the Soil Cover Area.

Section 5: Material Testing and Quality Confirmation. This section outlines the material testing and quality confirmation methods employed, including destructive and non-destructive testing of the FML and the compaction testing of installed root zone and topsoil material in the FML Cover Area.

Section 6: Health and Safety. This section summarizes the health and safety measures maintained during the project.

Section 7: Summary. This section provides an overall summary of the work on the Off-Site Area Final Engineered Cover.

Section 8: References. This section lists documents referred to in this report.

Appendix A contains a chronological summary of construction activities and Appendix B includes photographs of key tasks included in this CCR. Appendices C through J contain testing results and manufacturer specifications associated with the project activities.

2.0 RELOCATION OF PCB-IMPACTED MATERIAL

2.1 STOCKPILE OF PCB-IMPACTED MATERIAL IN FORMER FIRE POND AREA

During the PCB-Impacted Soil Excavation activities in 2001, impacted material was excavated from the wetland west of the ACS facility and used to fill and close the empty Fire Pond in the SBPA of the On-Site Area. The impacted material was analyzed for PCBs and was determined to contain levels below 50 parts per million (ppm), the established threshold requiring off-site disposal.

Since sampling showed that PCB concentrations were less than 50 ppm, no material required off-site disposal, and a larger volume of PCB-impacted soil was placed in the Fire Pond than originally estimated. This resulted in higher ground surface elevations than originally anticipated. Therefore, in order to meet the design grades in the On-Site Area, approximately 3,800 cubic yards of PCB-impacted material was relocated to drainage Swale 5 in the Off-Site Area (see Figure 1).

Additional information on the PCB-impacted material can be found in the PCB-Impacted Soil Excavation CCR (MWH, November 2002). Construction completion details regarding the Fire Pond Closure are included in the Still Bottoms Pond Area Interim Engineered Cover CCR (MWH, March 2004).

2.2 REMOVAL OF CLAY LAYER

Midwest Environmental, Inc. (MEI) was selected to perform the PCB-impacted material relocation during July 2002. MEI prepared the Swale 5 area of the Off-Site Area by removing the 12-inch thick clay cover using a bulldozer. The clay was stockpiled at the perimeter of Swale 5 for later reuse.

2.3 TRANSPORTATION AND PLACEMENT OF PCB-IMPACTED MATERIAL

PCB-impacted material was transported from the Former Fire Pond Area to the Off-Site Area using dump trucks loaded by an excavator. The dump trucks drove through the gate connecting the On-Site and Off-Site Areas where the material was unloaded into Swale 5 and graded smooth with a bulldozer in one 12-inch lift. Photographs 1 and 2 in Appendix B show the transportation of the PCB-impacted materials. The material was then compacted using a smooth drum vibrating roller in preparation for the replacement of the clay layer. Photographs 3 and 4 in Appendix B show the placement and compaction of the PCB-impacted materials.

Heavy equipment used to haul and compact the PCB-impacted material was visually examined for excess dirt between loads, and any identified soil was scraped off and placed in

Swale 5. Decontamination at the completion of the task was done using a pressure washer at the drum pad in the ACS facility. The decontamination water was pumped to the GWTP for treatment.

2.4 PLACEMENT AND COMPACTION OF CLAY LAYER

After the PCB-impacted material had been placed in Swale 5 to the determined grade, the 12-inch clay layer was then replaced and compacted on top of the PCB-impacted material in two six-inch lifts. Additional clay was imported from the same Merrillville, Indiana clay source as was used during the 2001 Interim Engineered Cover activities to supplement the clay that had been removed.

The clay was wetted as needed and compacted with a sheep's foot compactor and a smooth-drum roller until the compaction and moisture requirements for the interim clay cover were met. The compaction requirement for the clay was 95 percent of the maximum dry density of 115 pounds per cubic foot (pcf). The moisture requirement for the clay was 17 percent plus or minus 2 percent. Photographs 5 and 6 in Appendix B show the compaction efforts of the clay placement. The compaction and moisture testing was performed by Great Lakes Soil & Environmental, Inc. (Great Lakes). Compaction test results are included in Table 1. MWH measured final clay thicknesses in this area to confirm that sufficient thicknesses were achieved. The average measured clay thickness was 12 to 12.25 inches as shown on Table 2. However two measured thicknesses were less than 12 inches, one at 10 inches and the other at 11 inches. MWH determined that these two locations of deficient clay would not result in a significant increase in the infiltration rate. In addition, the flexible membrane layer (FML) was installed to provide the main barrier to infiltration with the clay only providing a secondary barrier. Based on the relatively small size of these potentially deficient areas, MWH determined that performing permeability testing at these locations was not necessary and that the overall clay thickness of the area was calculated to meet the project's hydraulic conductivity requirements for clay placement, based on average thickness.
Compaction and moisture testing results for this task are included in Appendix C. Figure 2 shows final ground surface contours after the replacement of the clay cover.

3.0 FINAL COVER INSTALLATION ACTIVITIES IN FML COVER AREA

3.1 MAINTENANCE ACTIVITIES

In preparation for the construction of the final cover, MWH developed a list of maintenance items to be completed in the Off-Site Area. MEI completed this preparatory work during June and July 2002. Tasks completed included: installation of protective concrete structures around piezometers and Barrier Wall Extraction System (BWES) extraction trench cleanouts, raising the manholes at extraction wells EW-12 and EW-13 to extend above the final grade elevation, implementation of erosion controls, and repair of erosion damage to the interim clay layer.

3.2 SITE PREPARATION AND GRADING

Environmental Contractors of Illinois, Inc. (ECI), the subcontractor selected to install the Off-Site Area final engineered cover, mobilized to the Site beginning August 21, 2002. A kickoff construction meeting was held on August 22.

ECI prepared the existing clay surface for FML installation by removing erosion matting, as well as weeds, rocks, and any material or debris greater than two inches in diameter that might puncture the FML. The clay subbase was further smoothed and proof-rolled as needed to facilitate FML installation. The subbase was also slightly regraded in areas to improve surface water runoff. Approximately ten cubic yards of additional clay were imported from the Merrillville clay source and placed near in-situ soil vapor extraction (ISVE) well SVE-10 to improve drainage.

In addition, small (four inch) mounds of sand were placed around each ISVE well and groundwater monitoring well prior to FML installation to ensure water would not collect around the wells. Photograph 7 in Appendix B shows the placement of sand around the ISVE wells.

3.3 CONSTRUCTION OF ANCHOR TRENCH

An anchor trench was constructed along the southern and western perimeter of the FML Cover Area to secure the FML. ECI constructed the anchor trench section by section prior to FML installation, beginning with the southern edge of the FML Cover Area and continuing north.

In the Final Remedial Design Report, two anchor details are shown on Figure C-16. Detail C depicts anchoring the FML on the sides of FML Cover Area that lay inside the barrier wall at the north and east edges. Detail D depicts anchoring the FML over the barrier wall located at the south and west edges of the FML Cover Area. Because the southern and western edges

of the FML Cover Area were within 18 inches of the drainage swale (Swale 1) that runs along the south and west edge of the Site, the anchor method shown on Detail D was not feasible. Therefore, the anchor method shown in Detail C was selected and used around the entire perimeter of the FML Cover Area. A detail of this anchor trench is shown on Figure 3. Photograph 8 in Appendix B shows typical anchor trench excavation activities.

As the anchor trench was being excavated, soil that was observed to contain debris or other visual indications of potential contamination was separated from the rest of the excavated material and stockpiled on plastic sheeting. Photograph 9 in Appendix B shows the procedure for handling debris excavated from the anchor trench. Once the FML had been placed in the trench, the stockpiled material was placed back in the trench with the material containing debris below the clay. Any debris that could potentially damage the FML was not placed back into the trench. Instead, this debris was transported to the On-Site Area and placed under the SBPA interim engineered cover. Photograph 10 in Appendix B shows the replacement of clay into the anchor trench.

The replacement of trench material was done so that the material containing debris was covered by at least 12 inches of clay. Because of the potential damage to the FML, a heavy compactor could not be used to compact the clay placed in the anchor trench. Therefore, the compaction standard of 95% of maximum dry density may not have been consistently achieved. Instead, low ground-pressure equipment was used to compact the clay placed in the anchor trench. This provided the compaction necessary to prevent erosion in the trench areas.

Trench corners were rounded to avoid sharp bends in the FML. Loose soil, sharp edged rocks larger than six inches in diameter, and any other debris that could damage the FML was removed from the surfaces of the trench.

At the locations where the barrier wall extended to the ground surface or relatively close to it, visual confirmation was used to ensure that the anchor trench was outside of the barrier wall. In areas where the barrier wall could not be seen, the survey of the anchor trench was compared to the as-built documentation from the barrier wall installation. In most locations, this comparison was sufficient to confirm that the anchor trench was outside of the barrier wall. Due to limitations in the precision of the barrier wall as-built documentation, this could not be confirmed at a few locations. However, in these cases, the clay component of the cover extends to the site perimeter fence. The barrier wall was installed within the perimeter fence, therefore while the FML may not extend over the barrier wall at all locations, the clay component of the cover system does. Because the perimeter of the barrier wall is not subject to ISVE treatment, the clay cover was considered to be sufficient to meet the intent of the cover at non-ISVE locations.

3.4 TEST PAD CONSTRUCTION

Prior to full-scale installation of FML material, ECI constructed a test pad to verify that the proposed construction equipment and methods used to place the root zone and topsoil material would not damage the FML. The test fill area was the width of one roll of FML, 23 feet wide and 65 feet long. This size allowed the construction equipment to reach the maximum operating speed of eight miles per hour (mph) operating speed over a minimum length of 25 feet.

The test fill was divided into two sections lengthwise. One half consisted of, from bottom to top, 12 inches of compacted clay (already in place), FML, 12 inches of root zone, and six inches of topsoil. This simulated the actual construction of the final engineered FML. The other half of the test fill consisted of, from bottom to top, 12 inches of compacted clay (already in place), FML, and 36 inches of root zone. This simulated the 36-inch thick temporary vehicle roads that were used by the dump trucks to place imported material across the Site.

A fully-loaded off-road dump truck was run back and forth across the 36-inch thick section of the test pad several times. A low-ground-pressure bulldozer was operated back and forth across the 18-inch thick section several times. These were the heaviest pieces of equipment to be used on each section of the Site. After the equipment ran over the test fill sections, a 20-foot by 20-foot section of the FML was exposed on the 18-inch thick section and a 20-foot by 10-foot section was exposed on the 36-inch thick section. ECI and MWH personnel visually inspected each section for damage to the FML. No evidence of damage was noted, indicating that the proposed construction activities could be performed without causing adverse effects to the FML.

After the low-ground-pressure bulldozer had run back and forth across the 18-inch thick section of soil multiple times, compaction and moisture testing was performed by K&S Engineers, Inc. (K&S). These results of the seven samples collected indicated the compaction levels could be expected during installation of the final cover. Results are included in Table 3 and Appendix D. Details regarding geotechnical testing of the soil materials used in the test pad and the final cover are contained in Section 5 of this report.

Photographs 11 and 12 in Appendix B show the preparation of the test pad.

3.5 FLEXIBLE MEMBRANE LINER INSTALLATION

Mid-America Lining (MAL), the subcontractor selected by ECI to install the FML in the Off-Site Area, mobilized on September 4. MAL and ECI confirmed that the subbase was satisfactory for placement of the FML. MAL began FML installation on September 5 and completed installation on September 7. Final extrusion welding and quality control testing was completed on September 10. MAL demobilized on September 11.

The FML was deployed using a specially fabricated roll-holder attached to a front-end loader. Adjacent pieces of FML were overlapped six inches for optimal weld during installation. The seam area was cleaned of dust, dirt, and foreign material prior to and during seaming. The seams were then welded using double hot wedge thermal fusion methods. After completion of seaming, each weld was non-destructively tested either by pressurizing the seam (for fusion welds) or by vacuum box method (for extrusion welds).

In addition to the non-destructive seam testing, destructive seam samples were collected every 500 feet of seam and sent to a third party laboratory for seam peel and shear testing. Areas where destructive testing samples were collected were patched and seamed using extrusion welds. Patches consisted of pieces of FML with rounded corners that extended a minimum of six inches beyond the edge of defects or destructive sample areas. Tears, holes, and blisters were repaired with patches as needed. Minor localized flaws were repaired by spot welding or seaming.

In areas where penetrations to the FML were required, such as ISVE wells, piezometers, and extraction wells, an "x" was cut in the FML so that the FML could be placed over the well or piezometer. A neoprene gasket was placed on the riser pipe and a boot made of FML material was extrusion welded to the gasket. An FML skirt was then welded to the boot and to the FML. A stainless steel clamp was then fastened over the neoprene gasket to ensure the seal at the top of the boot. A detail of those penetrations is shown on Figure 3. The penetrations are also shown in Photograph 18 in Appendix B.

Figure 4 shows the liner extents, including seam and testing locations. Factory test records for FML material are included in Appendix E. Field Test Records for FML installation are included in Appendix F, including non-destructive and destructive test logs and repair logs. Appendix F also contains the panel placement log and panel seaming form.

Photographs 13 through 25 in Appendix B show the various FML installation activities.

3.6 ROOT ZONE MATERIAL PLACEMENT

Root zone material placement over the completed FML began on September 9. The root zone was placed in one 12-inch lift. Original plans specified that the root zone would be placed and compacted in six-inch lifts. However, the placement of the root zone was conducted in one 12-inch lift because of concerns that moving heavy equipment across only six inches of material may damage the FML. The thickness of the root zone material (and subsequently the topsoil material) was typically less than 12-inches along the edge of the cover because the cover had to be tapered down to meet the elevation of the drainage swale to the west and south.

ECI began root zone placement by using the wetland sand material (Material Number 1) from the construction of the wetland pond during 2001 that was stockpiled in the Off-Site Area from the construction of the wetland pond during 2001. The stockpile area is shown on Figure 1. When all the material from this stockpile was placed, approximately 4,355 cubic

yards, root zone material was imported from a borrow source in Merrillville, Indiana (Material Number 2) until that source was also exhausted. The Merrillville source accounted for approximately 5,115 cubic yards of material. Finally, ECI imported approximately 4,162 cubic yards of material from a borrow source in Griffith, Indiana (Material Number 3). ECI completed placement of root zone material over the FML on September 26. Compaction and moisture testing was completed on October 1. Photographs 26 through 30 show the activities involved with the root zone placement.

Low-ground-pressure equipment was used to compact the soil in order to minimize potential damage to the FML. The initial minimum compaction target was 90 percent of maximum dry density. However, after reviewing the compaction data from the test pad and initial field compaction, it was determined that the low ground pressure equipment could not achieve 90 percent compaction consistently at the site. Therefore, the compaction target was lowered to 80 percent of maximum dry density. The 80 percent compaction target was selected because it could be achieved with the low ground pressure equipment without an increased potential for damaging the FML but would not significantly impact the ability of the root zone material to support root growth or minimize erosion. The root zone material was placed with an allowable moisture range from optimum moisture minus 2% to optimum moisture plus 2%. When the root zone material was in this range, it could be easily placed and compacted without clumping or pumping.

Chemical analytical testing of borrow source materials is discussed in Section 5.1.1 and results are included in Appendix G and summarized in Table 4. The geotechnical data for the three soil sources and the in-place density tests are included in Appendices H and I, respectively, and summarized in Table 5. In Appendices H and I, Material Number 1 is referred to as K&S Reference Number 1, Material Number 2 is referred to as K&S Reference Number 2, and Material Number 3 is referred to as K&S Reference Number 4. Figure 5 shows the root zone compaction and moisture testing locations and the results are summarized in Table 6. Contours of the top of placed root zone material are shown on Figure 6.

3.7 TOPSOIL PLACEMENT AND SEEDING

ECI began topsoil placement on September 26 in areas where the completed root zone had been installed and tested successfully. ECI imported approximately 7,931 cubic yards of Material Number 3 for use as topsoil. This material was the same borrow source material imported and installed as root zone (see Section 3.6).

Six inches of topsoil material were spread across the FML Cover Area in one lift. Contours of the top of placed topsoil material (the completed as-built of the site), including the new access road (discussed in Section 3.8), are shown on Figure 7. Topsoil placement was completed on October 2. The compaction requirement for the topsoil was the same as that of the root zone material and is discussed in Section 3.6. Photograph 31 in Appendix B shows the placement and spreading of the top soil material.

Cooling Landscape Contractors was selected to seed the topsoil of the FML Cover Area and former excavated wetland material stockpile area. Grass seed was placed on October 3 using a small tractor. Straw was then placed over the seed areas to protect the seed and minimize erosion. The Class R seed used met Indiana Department of Transportation Standard Specifications. Photograph 32 in Appendix B shows the site after it has been seeded. A copy of the specifications for the seed that was used in the cover area is included in Appendix K.

After construction was completed, the data from the surveys was reviewed and indicated that 18 areas in the cover area did meet the thickness requirements for the topsoil. Therefore, on August 18 and 19, 2003, ECI was on-site placing additional topsoil in these areas. The ground in each area was scarified, additional topsoil provided by Austgen Equipment from the Material Number 3 borrow source was placed and compacted with a seeding tractor, seed was applied, and straw was placed. Surveys were completed before and after the work to confirm that a sufficient amount of topsoil had been placed. The survey elevations and contours on Figure 7 document the final elevations. Photographs 35 through 38 show the placement of additional topsoil in the indicated areas.

Additional topsoil was not placed at six locations where the thicknesses ranged from 1.35 to 1.38 feet. These locations would have required less than 2 inches of additional soil to meet the required cover thickness. Since vegetation had already taken hold at these locations, MWH determined that the process of adding the additional soil would have caused an increased potential for erosion. Therefore, MWH determined that the thicknesses in these areas were sufficient and no additional soil was added.

Topsoil and grass currently cover the entire Off-Site Area with the exception of the ISVE Blower Shed, access road, detention pond, rip-rap lined perimeter drainage swales, and stockpiled wood chips and logs located in the northeast and northwest portions of the Site.

3.8 ACCESS ROAD INSTALLATION

A temporary access road was constructed in September 2001 to provide access to the Off-Site Area ISVE blower building and well field. This temporary access road consisted of a geotextile fabric with nine inches of gravel. The temporary road was removed prior to the PCB-impacted material relocation activities in July 2002 and the gravel was stockpiled for use in the permanent access road.

The permanent access road was installed on October 2, 2002 after the completion of the final engineered cover, as shown in Figure 7. A cross-section of road is shown on Figure 3. The road connects the southeast gate of the Off-Site Area to the ISVE blower shed. The permanent access road was constructed in the same way as the temporary access road, consisting of a geotextile fabric with nine inches of gravel.

3.9 REPAIR TO SOIL VAPOR EXTRACTION WELL SVE-38

During grading activities, soil vapor extraction well SVE-38 was struck by a piece of heavy equipment. Upon inspection, it was noted that only the well casing was damaged and the saddle and appurtenances were still intact. Because the casing was damaged above the connection point of the riser to the saddle, it was replaced. Once the casing was replaced, it was vacuum tested to ensure that neither the casing nor saddle were leaking. After this was confirmed, the saddle was covered with bentonite and a new FML boot and skirt were installed on the well on October 10, 2002. Seams were successfully vacuum box tested in accordance with the procedures detailed in Section 5.3.3.2 of this report. Photographs 33 and 34 in Appendix B show the seam repairs performed at SVE-38.

4.0 SUMMARY OF FINAL COVER INSTALLATION ACTIVITIES IN SOIL COVER AREA

4.1 CLAY PLACEMENT

The Soil Cover Area is the portion of the Off-Site Area that is not directly treated by the ISVE system and is not covered by the FML. The cover for this area consists of 18 inches of compacted clay covered with 6 inches of topsoil and vegetation.

Koester Environmental Services (KES) installed the interim engineered cover in the Off-Site Area in 2001. KES installed 12 inches of clay in the FML Cover Area and 18 inches of clay in the Soil Cover Area. The clay was installed in six-inch lifts and compacted to at least 95 percent of maximum density with a moisture content between optimum moisture and optimum moisture plus 2 percent.

The 18 inches of clay placed in the Soil Cover Area met the clay thickness requirement of the Final Remedial Design Report for the final engineered cover in the non-ISVE area. Additional information regarding clay placement in the Soil Cover Area, including geotechnical and chemical analytical data from imported clay, clay compaction test results, and clay thickness information derived from survey data can be found in the Off-Site Area Interim Engineered Cover CCR (MWH, February 2003).

4.2 TOPSOIL AND GRASS SEED PLACEMENT

After installing 18 inches of clay in the Soil Cover Area of the Off-Site Area, KES covered the compacted clay with topsoil imported from the Material Number 3 borrow source. The topsoil was installed to a depth of six inches during the end of August and the beginning of September 2001. Topsoil was not placed in the FML Cover Area at this time.

Slusser Company planted grass seed across the topsoil using a hydroseeding method. Grass seed was spread across approximately 55 percent of the Soil Cover Area. The remaining portion of the Soil Cover Area, the eastern edge of the Site, was used to stockpile soil from the construction of the pond during the wetland restoration in September 2001. This soil was used as the initial root zone material for the final FML cover system.

Additional information regarding topsoil and grass seed placement in the Soil Cover Area, including chemical analytical data from imported topsoil, can be found in the Off-Site Area Interim Engineered Cover CCR (MWH, February 2003).

5.0 MATERIAL TESTING AND QUALITY CONFIRMATION

5.1 IMPORTED SOIL MATERIAL TESTING

5.1.1 Chemical Analytical Testing

Four different soil sources were used during the completion of the final engineered cover during 2002. One source provided clay material and the other three sources provided root zone and topsoil material.

Clay was imported for the PCB-impacted material relocation activities (former Swale 5 area) from the same borrow source in Merrillville, Indiana used during the installation of the interim cover in 2001. The soil used for the root zone material came from three sources: the Material Number 1 stockpile, imported from the Material Number 2 source, and imported from the Material Number 3 source. Material Number 3 was also used as topsoil in the FML Cover Area.

5.1.1.1 Clay Imported from Merrillville Source

Chemical analysis of the clay imported from the Merrillville clay borrow source during the interim cover activities of 2001 indicated that it did not contain any compounds above the United States Environmental Protection Agency (Region IX) Preliminary Remediation Goals (PRG) or the Indiana Department of Environmental Management's (IDEM's) Risk-Integrated System of Closure (RISC) default values. Therefore, the clay was not analyzed again during the 2002 construction activities. The Off-Site Area Interim Engineered Cover CCR (MWH, February 2003) further discusses this chemical analysis.

5.1.1.2 Root Zone Used From Wetland Restoration

In August 2001, PCB-impacted soils were excavated from a wetlands area located northwest of the Off-Site Area. A portion of this work included the restoration of the wetland area after the PCB-impacted material was removed. The area was restored by constructing an open-pond. Samples of the soils excavated during the pond construction, confirmed that the soil was below the PCB cleanup objective of one ppm, so they were hauled to the Off-Site Area and stockpiled for future use. Because this soil met the PCB cleanup objective and was not imported material, no further analysis was performed.

5.1.1.3 Root Zone Imported from Merrillville Source

The root zone material imported from the Merrillville (Material Number 2) source was sampled on July 18, 2002 for chemical analysis and analyzed for Pesticides/PCBs, VOCs, semivolatile organic compounds (SVOCs), and inorganics. The laboratory data sheets for this sample are contained in Appendix G and the results and screening comparisons are summarized in Table 4. The contractor's certification letter is also included in Appendix G.

The Final Remedial Design Report, including Construction Quality Assurance Plan (CQAP) and Performance Standard Verification Plan (PSVP), does not outline standards to be used to determine acceptable import material. Therefore, MWH used the U.S. EPA Region IX PRGs

and IDEM RISC Nonresidential Default Closure Levels as guidelines. Material Number 2 was found to meet these requirements with the following exceptions:

- The typical laboratory reporting limits for seven semi-volatile organic compounds (2,4-dinitrophenol, 2-nitroaniline, 3,3'-dichlorobenzidine, benzidine, bis-(2-chloroethyl) ether, bis(2-chloroisopropyl)ether, and N-nitrosodi-n-propylamine) are higher than the lower of the two guideline values used. However, because the reporting limits for each of these seven compounds is lower than one of the guideline values, the clay was found to be acceptable for on-site use.

- An arsenic concentration of 6.8 milligrams per kilogram [mg/kg] was detected in Material Number 2. This concentration met the IDEM RISC level of 20 mg/kg but exceeded the Region IX PRG of 2.7 mg/kg. However, comparison of this arsenic detection with the regional (Greater Chicago Metropolitan Area) background range (1.1 to 24 mg/kg) determined in a study published by the Illinois Environmental Protection Agency (IEPA) in 1994 indicates that this data is well below the upper limit of the published regional background concentration range. The findings of the IEPA study, titled *A Summary of Selected Background Conditions for Inorganics in Soil*, are based upon analysis of the Greater Chicago Metropolitan Area. The IEPA study was considered because no similar study or background arsenic values have been published specifically for Indiana.

5.1.1.4 Root Zone/Topsoil Imported from Griffith Source

During the installation of the final engineered cover in 2002, material was imported from the Material Number 3 source for use as root zone and soil. Samples of Material Number 3 were collected and analyzed in 2001 for use as topsoil during the installation of the Off-Site Area interim engineered cover (see Off-Site Area Interim Engineered Cover CCR for more details). Results of the chemical analysis performed in 2001 indicated that compounds were below the Region IX PRG and/or RISC values. Therefore, Material Number 3 was not re-analyzed during the 2002 construction activities.

5.1.2 Geotechnical Testing

The imported clay was analyzed for geotechnical characteristics in 2001, and data has been included in the Off-Site Area Interim Engineered Cover CCR (MWH, February 2003). The imported soils from both the Merrillville and Griffith sources were analyzed for geotechnical characteristics including particle size, maximum density, and optimum moisture. The geotechnical classification samples were collected at a frequency of 1 per 5,000 cubic yards of material delivered to the site. The wetland sand material was only analyzed for maximum density and optimum moisture. K&S performed these geotechnical analyses and the materials were found to be acceptable. The geotechnical testing reports are included in Appendix H and the results are summarized in Table 5.

K&S also conducted in-place soil density testing of the installed root zone and topsoil materials. Compacted soil was tested to ensure that it was compacted to at least 80 percent of maximum dry density at optimum moisture +/- 2 percent. An exception to this was for

moisture in Material Number 1 for which a wider range of moisture contents in sand was acceptable for compaction.

In-place soil testing was conducted with a nuclear density testing unit at a frequency of 8 tests per acre per lift. The field quality assurance test results were compared to the maximum dry density and optimum moisture as determined in the laboratory. If either the density or moisture requirements were not met, the non-passing areas were reworked as necessary and retested until the criteria were met. As Table 6 shows, at the project's completion all locations met the compaction and moisture requirements. In addition, sand cone method tests were performed to verify the accuracy of the nuclear density testing unit. The results of the sand cone tests are summarized in Table 7. Test results are also included in Appendix I.

5.1.3 Visual Inspection

The imported material, including clay, root zone, and topsoil, and non-imported Material Number 1 was visually inspected for grass, roots, brush, other organic material, debris, and refuse. The material was found to be suitable for cover material. Discovered debris, such as small pieces of wood or concrete, were removed prior to placement.

5.2 FACTORY TESTING OF FML MATERIAL

After being manufactured, each roll of FML material was tested in the factory for thickness, percentage carbon black content, tear resistance, puncture resistance, tensile strength at break, elongation at break, carbon black dispersion, and density. Copies of test results were included with each roll delivered to the Site. These test results are included in Appendix E. MWH reviewed and approved the test results prior to FML installation. Several of the rolls delivered to the Site had a tear resistance that was slightly less than the requirements of the specifications. Because the tear resistance was only slightly less, MWH deemed these rolls acceptable. Also several rolls exceeded the specification for the density of resin but were also considered acceptable.

5.3 FIELD TESTING OF FML

5.3.1 Visual Observation

MWH personnel visually examined the FML rolls upon delivery for evidence of damage. No damage was observed upon delivery or during installation. In addition, prior to covering the FML with root zone material, the FML material and all seams were visually inspected by MWH, ECI, and MAL for defects, holes, or damage due to weather conditions or construction activities. No deficiencies were noted.

5.3.2 Trial Weld Testing

Trial welds were made on test strips of excess FML under field conditions to verify that seaming methods were adequate. Prior to beginning production work each day and after every four hours of production work, trial welds were constructed and tested by each person

performing seaming work and each piece of seaming equipment used that day. One sample was obtained from each trial seam. The sample was at least 36 inches long by 20 inches wide with the seam centered lengthwise. Ten random specimens were cut one inch wide from the sample. Five seam specimens were tested for shear strength and five for peel adhesion using an approved quantitative tensiometer.

The minimum permitted shear strength was 72 pounds per inch of width (lbs./in. width). The minimum permitted peel adhesion strength was 60 lbs./in. width. To be acceptable, four out of five replicate test specimens were required to meet the specified seam strength requirements. No trial seam tests failed during the completion of this project. A copy of the trial weld log is included in Appendix F.

5.3.3 Fusion and Extrusion Weld Nondestructive Testing

5.3.3.1 Pressure Testing of Fusion Welds

Field fusion seams were nondestructively tested over their full length to insure seam continuity, in accordance with ASTM D5820 and MAL's approved quality control manual. The fusion seams were sealed at both ends and pressurized to at least 25 pounds per square inch (psi) (typically 30 psi). The seam pressure was not permitted to vary more than four psi over a five-minute period to be considered in compliance. Seam testing was performed as the seaming work progressed, rather than at the completion of field seaming. The non destructive test log in Appendix F documents that all fusion seams were successfully tested.

5.3.3.2 Vacuum Testing of Extrusion Welds

Field extrusion welds were nondestructively tested using the vacuum box method to insure seam continuity. The vacuum box method consisted of wiping soapy water over the seam to be tested and placing a clear plastic box, approximately eight-inches by 16-inches, over the seam. This box was then subjected to a low vacuum and observed for the presence of large air bubbles. The presence of large air bubbles would indicate a seam deficiency that would leak air under a vacuum. No deficiencies were observed during the testing of extrusion welds. The non-destructive test log in Appendix F documents that all extrusion welds were successfully tested.

5.3.4 Fusion and Extrusion Weld Destructive Testing

Seam samples for destructive testing were cut from the installed FML every 500 linear feet of welding at locations specified by MWH. One sample per 500 linear feet was utilized because it is MAL's typical quality control frequency.

Destructive seam samples were a minimum of 12 inches wide by 42 inches long with the seam centered lengthwise. Each sample was cut into three equal pieces with one piece retained by MAL, one piece sent to TRI Environmental, Inc. (TRI), the third party independent laboratory, and the remaining piece given to MWH for quality assurance testing and a permanent record. Each destructive sample was numbered and cross-referenced to the following information included in the field log: seam number, panel/sheet number (same as seam number), date cut, seaming machine used, and name of person performing the seaming.

Ten one-inch wide replicate specimens were cut from MAL's portion of each destructive sample. Five specimens were tested for shear strength and five for peel adhesion using an approved field quantitative tensiometer, and in accordance with ASTM D4437. To be acceptable, four out of five replicate test specimens were required to meet the specified seam strength requirements. If the field tests passed, five specimens were tested by TRI in the laboratory for shear strength and five for peel adhesion in accordance with ASTM D6392. To be acceptable, four out of five replicate test specimens were required to meet the specified seam strength requirements. If the field or laboratory tests failed, the seam was to be repaired. Destructive seam sample holes were patched the same day they were cut.

A total of 30 destructive samples were collected: 27 destructive samples were collected and tested from fusion welds and three destructive samples were collected and tested from extrusion welds. The destructive tests were tested in the same manner as the trial welds for shear strength and peel adhesion. The minimum permitted shear strength was 72 lbs./in. width. The minimum permitted peel adhesion strength was 60 lbs./in. width. Both field and laboratory destructive test results are included in Appendix F.

All field destructive tests met the shear and peel requirements. All laboratory destructive tests met the shear and peel requirements, with the exception of destructive sample DS-29. This extrusion weld failed destructive testing and was successfully repaired and retested following the method discussed below.

5.3.5 Repairs and Additional Testing

Every location where a destructive sample was removed, the FML was repaired and patched using extrusion welding. Similar repairs were performed at butt seam locations and any other location where a repair was deemed necessary. Each repair location was nondestructively tested using a vacuum box (see Section 5.3.3.2). Appendix F contains the repair log for this project.

If a seam failed destructive seam testing, additional testing was performed. The seaming path was retraced to an intermediate location ten feet on each side of the failed seam location. At each location, a 12 by 18-inch minimum size seam sample was taken for two additional shear strength and two additional peel adhesion tests. If these tests passed, then the remaining seam sample portion was sent to the laboratory TRI for five shear strength and five peel adhesion tests. To be acceptable, four out of five replicate test specimens were required to meet specified seam strength requirements. If these laboratory tests passed, then the seam was repaired between the passing test location and the original failed location. If field or laboratory tests failed, then the process was to be repeated. After cap stripping, the entire cap stripped seam was nondestructively tested using the vacuum box method.

5.4 EVALUATION OF CONSTRUCTION MATERIALS

MWH reviewed and approved the product specifications for the geotextile fabric used in the construction of the access road prior to installation. MWH found the mass, thickness, apparent opening size, grab tensile strength, and puncture strength of the geotextile fabric to

be satisfactory. During installation MWH visually inspected the geotextile fabric and did not discover any deficiencies. A copy of the manufacturer's cut-sheet for the geotextile fabric is included in Appendix K.

5.5 SURVEYING

The site was surveyed before, during, and after the placement of the final FML cover system to confirm that the minimum cover thicknesses were obtained. These surveys were used to develop final "as-built" drawings. Surveying was performed by Duneland Surveyors and certified by an Indiana-licensed surveyor. Table 8 summarizes the depth of root zone and topsoil material placed. It should be noted that the survey data indicates that multiple areas along the drainage swale on the west and south ends of the site have "negative" thicknesses. The Duneland survey of the subbase was performed prior to clearing and grubbing of the site and regrading of eroded soil that had collected at the edge of the drainage ditch. No additional survey was performed once these activities were completed. Due to the state of the cover along the drainage ditch prior to these activities, it is possible that clearing and grubbing of vegetation and regrading soil would account for significant changes in elevation as indicated on Table 8. The "negative" thicknesses should not provide a problem to the cover because visual inspection indicates that there is sufficient soil cover in these areas to provide adequate protection of the FML. In addition, the areas of "negative" thicknesses are all on the edge of the cover where vehicle traffic is restricted.

The survey also indicates that the thickness of the root zone and top soil materials at the south and west edges of the cover area was less than 18 inches. Because the cover needed to be graded into the swale running along these edges (Swale 1), the edges of the cover are tapered and the thickness of the root zone material and the topsoil material is subsequently less than 12-inches along the edge.

After completion of the final engineered cover, the total in-place root zone for the FML Cover Area was 12 inches or greater and the total in-place topsoil was six-inches or greater with the exception of the six locations discussed in Section 3.7. Material thicknesses for the Soil Cover Area, as reported in the Off-Site Area Interim Engineered Cover CCR, also meet the requirements of the Final Remedial Design Report.

Arc Design was used to perform the survey of the 18 areas that were determined to have deficient cover thicknesses. Arc Design surveyed the deficient areas before and after additional soil was placed to ensure that sufficient soil was placed. In addition to the 18 deficient areas, Arc Design surveyed the entire cover area. The survey data collected by Arc Design was used to create the final contours for the site.

During the PCB-impacted material relocation activities MWH used a survey rod and transit to verify that the clay layer replaced over the area of Swale 5 was 12 inches thick or greater. In addition, MWH physically measured final clay thicknesses in this area to confirm that sufficient thicknesses were achieved. This confirmation was done by augering a small hole in the clay and using a tape measure to determine the actual thickness. This confirmation

was performed at eight locations and the average measured clay thickness was 12 to 12.25 inches as shown on Table 2. However, two measured thicknesses were less than 12 inches, one at 10 inches and the other at 11 inches. After the thickness at each location was measured, the clay was replaced and recompacted.

6.0 HEALTH AND SAFETY

6.1 RELOCATION OF PCB-IMPACTED MATERIAL

A kickoff health and safety meeting was held on July 23, 2002 prior to beginning the work of transporting the PCB-impacted material. Daily tailgate health and safety meetings were conducted throughout the relocation activities. During these meetings, the importance of safe work practices, especially when working with heavy equipment, was regularly emphasized.

Work was conducted in Level D personal protection equipment (PPE), which included safety shoes, hard hats, and safety glasses. Latex overboots were worn when workers needed to access the areas with exposed impacted material. Because the contaminants of concern, PCBs, did not pose an inhalation hazard, air monitoring was not performed during the project.

The temporary access road was created in the former Fire Pond Area using geotextile fabric. This road allowed dump trucks to back up to the stockpile without potentially tracking excess material away from the work area. Trucks transporting excavated material were also visually inspected and cleaned off as necessary to prevent the tracking of excavated material. Equipment was decontaminated by pressure washing as needed and at the completion of the job.

6.2 FINAL COVER INSTALLATION ACTIVITIES

A kickoff health and safety meeting for the final cover installation was conducted on August 22, 2002 for all active construction workers from ECI. A second kickoff health and safety meeting was conducted on September 4, 2002 for MAL personnel. Daily tailgate health and safety meetings were conducted throughout the project. During these meetings, the importance of safe work practices, especially when working with heavy equipment, knives, and welding equipment, was regularly emphasized. Emphasis was also placed upon communication between ECI and MAL crew members. Due to the fact that many members of the MAL crew were not fluent English speakers, steps were taken to ensure that the topics discussed during all health and safety meetings were translated. Also, members of the English-speaking MAL crew were designated to coordinate the non-English crew in the case of an emergency.

Work was conducted in Level D PPE, which included safety shoes, hard hats, and safety glasses with the exception of the MAL liner installer crew. The MAL crew was allowed to wear tennis shoes instead of safety shoes when working on the FML to reduce the potential for damage to the FML. During the excavation of the anchor trench around the perimeter of the FML Cover Area, air monitoring was conducted regularly due to the potential VOCs present. These air monitoring results, included in Appendix J, dictated the proper PPE for this work in accordance with the site health and safety plan. Air monitoring results were all less than one ppm. Therefore, trenching work was also performed in Level D PPE.

During the repair of soil vapor extraction well SVE-38, air monitoring was conducted in the breathing space and vicinity around the well when the well was open. Level C air respirators were worn as a precaution during the well repair when the well was open to the atmosphere.

A health and safety meeting was also conducted on October 3 with the Cooling Company, the grass seed installation crew scheduled to perform work in the Off-Site Area.

7.0 SUMMARY

Interim and final engineered covers were placed over the Off-Site Area during 2001 and 2002. As described in the Final Remedial Design Report, these covers were constructed to eliminate potential direct contact with VOC- and PCB-contaminated soils (and lead-contaminated soils in the K-P Area) and eliminate potential worker contact with VOC-contaminated groundwater. The covers were also installed to reduce the potential for contaminant migration to groundwater by reducing infiltration into these areas, and to provide a surface seal for the ISVE system to minimize potential short-circuiting and maximize the capture of VOC vapors. Finally, the covers reduce the stormwater infiltration into the area inside the barrier wall. This reduces the amount of groundwater that needs to be extracted and treated by the GWTP during ISVE implementation and long-term operation of the BWES.

During 2001, a clay interim cover was placed over the entire Off-Site Area and a final cover was placed over portions of the Off-Site Area, as documented in the Off-Site Area Interim Engineered Cover CCR (MWH, February 2003). During 2002, the final cover was completed across the remainder of the Off-Site Area, including the installation of an FML cover.

8.0 REFERENCES

Remedial Investigation Report (Warzyn, Inc., June 1991).

A Summary of Selected Background Conditions for Inorganics in Soil (Illinois Environmental Protection Agency, August 1994).

Site Safety Plan (Montgomery Watson, January 1996).

Final Remedial Design Report (Montgomery Watson, August 1999).

Quality Assurance Project Plan (QAPP) for the American Chemical Service, Inc. (ACS) NPL Site in Griffith, Indiana (MWH, November 2001).

Work Plan for the Off-Site Containment Area Engineered Cover (ECI, August 2002)

Construction Quality Assurance Plan for the Off-Site Containment Area Engineered Cover (ECI, August 2002)

Health and Safety Plan for the Off-Site Containment Area Engineered Cover (ECI, August 2002)

Construction Completion Report, Off-Site Containment Area Engineered Cover, American Chemical Services, Inc. (ECI, October 2003)

Final PCB-Impacted Soil Excavation CCR (MWH, November 2002).

Final Off-Site Area Interim Engineered Cover Construction Completion Report (MWH, February 2003).

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TABLES

Table 1
Clay Cover Moisture and Compaction Test Results
Preparation for Off-Site Final Engineered Cover
ACS, NPL Site
Griffith, Indiana

Sampling Location	Date Tested	Lift Number[1]	Probe Depth (inches)	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Specification, % Moisture	Specification, % Proctor	Pass/ Fail
1	7/26/2002	1	6	109.3	17.9	115.0	95.0	17.0	95.0	Pass
2	7/26/2002	1	6	109.4	18.3	115.0	95.1	17.0	95.0	Pass
3	7/29/2002	1	6	109.4	18.0	115.0	95.1	17.0	95.0	Pass
4	7/29/2002	1	6	109.3	18.6	115.0	95.1	17.0	95.0	Pass
5	7/29/2002	1	6	110.4	17.3	115.0	96.0	17.0	95.0	Pass
6	7/29/2002	1	6	109.6	18.3	115.0	95.3	17.0	95.0	Pass
7	7/29/2002	1	6	110.1	17.0	115.0	95.7	17.0	95.0	Pass
8	7/29/2002	1	6	109.4	18.0	115.0	95.2	17.0	95.0	Pass
9	7/29/2002	1	6	110.6	17.6	115.0	96.2	17.0	95.0	Pass
10	7/29/2002	1	6	109.7	18.0	115.0	95.4	17.0	95.0	Pass
11	7/29/2002	1	6	109.3	18.2	115.0	95.0	17.0	95.0	Pass
12	7/31/2002	1	6	109.3	17.6	115.0	95.0	17.0	95.0	Pass
13	7/31/2002	1	6	109.4	18.0	115.0	95.1	17.0	95.0	Pass
14	7/31/2002	1	6	110.1	17.5	115.0	95.7	17.0	95.0	Pass
15	7/31/2002	1	6	109.5	17.2	115.0	95.2	17.0	95.0	Pass
16	7/31/2002	1	6	110.0	18.5	115.0	95.6	17.0	95.0	Pass
17	7/31/2002	1	6	109.9	18.0	115.0	95.5	17.0	95.0	Pass
18	7/31/2002	2	6	109.6	17.0	115.0	95.3	17.0	95.0	Pass
19	7/31/2002	2	6	109.9	18.7	115.0	95.5	17.0	95.0	Pass
20	7/31/2002	2	6	109.3	18.0	115.0	95.0	17.0	95.0	Pass
21	7/31/2002	2	6	109.2	17.6	115.0	95.0	17.0	95.0	Pass
22	7/31/2002	2	6	109.3	18.0	115.0	95.0	17.0	95.0	Pass
23	7/31/2002	2	6	110.6	17.4	115.0	96.1	17.0	95.0	Pass
24	7/31/2002	2	6	109.6	18.9	115.0	95.3	17.0	95.0	Pass
25	7/31/2002	2	6	109.2	17.0	115.0	95.0	17.0	95.0	Pass
26	7/31/2002	2	6	113.0	17.1	115.0	98.2	17.0	95.0	Pass
27	7/31/2002	2	6	109.3	18.1	115.0	95.0	17.0	95.0	Pass
28	7/31/2002	2	6	111.4	17.6	115.0	96.8	17.0	95.0	Pass
30[2]	7/31/2002	2	6	112.1	17.4	115.0	97.4	17.0	95.0	Pass
31	7/31/2002	2	6	110.7	18.0	115.0	96.2	17.0	95.0	Pass
32	7/31/2002	2	6	109.4	19.2[3]	115.0	95.1	17.0	95.0	Pass
33	7/31/2002	2	6	109.5	17.0	115.0	95.2	17.0	95.0	Pass

Notes:

1. Lift 1 was placed first. Lift 2 was placed second, on top of Lift 1.
2. No test was taken at sampling location 29.
3. Although this moisture result exceeded the specification range, it was determined that sufficient compaction was obtained to meet the hydraulic conductivity requirements of the project and further working of the soil would not be beneficial to reduce the moisture content by 0.2%.

Tests were conducted by Great Lakes Soil & Environmental Consultants using a nuclear density testing unit.

Tests which did not yield passing results were not reported in this table. Instead, the clay was reworked and retested until a passing result was obtained.

Table 2
Measured Clay Thickness
Preparation for Off-Site Final Engineered Cover
ACS, NPL Site
Griffith, Indiana

Sampling Location	Date Tested	Measurement of Clay Thickness (inches)
18	7/31/2002	10
18 retest[1]	7/31/2002	12
22	7/31/2002	12.5
24	7/31/2002	13.5
25	7/31/2002	12
	Average Thickness	12
26	7/31/2002	12.5
27	7/31/2002	11
30	7/31/2002	12.5
33	7/31/2002	13
	Average Thickness	12.25

Note:

1. An additional test was taken 5 feet east of the initial test.
2. The sample locations are shown on Figure 1.

Table 3
Test Pad Moisture and Compaction Test Results
ACS NPL Site
Griffith, Indiana

Date	Location	Soil Material	Maximum Laboratory Density (pcf)	Optimum Moisture Content (%)	In-Place Dry Density (pcf)	In-Place Moisture (%)	Percent Compaction
09/04/02	10' N & 5' E of South West Corner	Material Number 3 - Topsoil	97.0	21.5	91.4	17.1	94.2%
09/04/02	20' N & 10' E of South West Corner	Material Number 3 - Topsoil	97.0	21.5	94.3	13.6	97.2%
09/04/02	30' N & 18' E of South West Corner	Material Number 3 - Topsoil	97.0	21.5	86.6	11.6	89.2%
09/04/02	15' N & 4' E of South West Corner	Material Number 1 - Root Zone	109.0	11.0	105.8	7.2	97.2%
09/04/02	25' N & 18' E of South West Corner	Material Number 1 - Root Zone	109.0	11.0	106.3	7.4	97.5%
09/04/02	30' N & 16' E of South West Corner	Material Number 1 - Root Zone	109.0	11.0	105.8	9.1	97.0%
09/04/02	5' N & 15' E of South West Corner	Material Number 1 - Root Zone	109.0	11.0	109.6	9.4	100.0%

Notes

pcf - pounds per cubic foot

See Appendix D of this report for geotechnical testing results presented in this table.

Table 4
Chemical Analytical Data for
Merrillville Borrow Source Material
ACS NPL Site
Griffith, Indiana

Analyte	U.S.EPA Region IX *Preliminary* Remediation Goals[1]	IDEM RISC *Nonresidential* Default Closure Levels[2]	Sample *Collected* Units	Merrillville Source 7/18/2002 Result	Q
Volatile Organic Compounds					
1,1,1-Trichloroethane	1,400,000	35,000	µg/Kg	< 5.0	U
1,1,2,2-Tetrachloroethane	900	110	µg/Kg	< 5.0	U
1,1,2-Trichloroethane	1,900	300	µg/Kg	< 5.0	U
1,1-Dichloroethane	2,100,000	58,000	µg/Kg	< 5.0	U
1,1-Dichloroethene	120	58	µg/Kg	< 5.0	U
1,2-Dichloroethane	760	150	µg/Kg	< 5.0	U
1,2-Dichloropropane	770	250	µg/Kg	< 5.0	U
2-Butanone	28,000,000	260,000	µg/Kg	< 10.0	U
2-Hexanone	NE	NE	µg/Kg	< 10.0	U
4-Methyl-2-Pentanone	2,900,000	39,000	µg/Kg	< 10.0	U
Acetone	6,200,000	41,000	µg/Kg	< 10.0	U
Benzene	1,500	670	µg/Kg	< 5.0	U
Bromodichloromethane	2,400	630	µg/Kg	< 5.0	U
Bromoform	310,000	2,700	µg/Kg	< 5.0	U
Bromomethane	13,000	NE	µg/Kg	< 10.0	U
Carbon Disulfide	720,000	82,000	µg/Kg	< 5.0	U
Carbon tetrachloride	530	290	µg/Kg	< 5.0	U
Chlorobenzene	540,000	27,000	µg/Kg	< 5.0	U
Chloroethane	6,500	5,200	µg/Kg	< 10.0	U
Chloroform	520	1,200	µg/Kg	< 5.0	U
Chloromethane	2,700	NE	µg/Kg	< 10.0	U
cis-1,2-Dichloroethene	150,000	5,800	µg/Kg	< 5.0	U
cis-1,3-Dichloropropene	NE	NE	µg/Kg	< 5.0	U
Ethylbenzene	230,000	200,000	µg/Kg	< 5.0	U
m,p-Xylene	NE	NE	µg/Kg	< 5.0	U
Methylene chloride	21,000	1,800	µg/Kg	< 5.0	U
o-Xylene	NE	NE	µg/Kg	< 5.0	U
Styrene	1,700,000	720,000	µg/Kg	< 5.0	U
Tetrachloroethene	19,000	640	µg/Kg	< 5.0	U
Toluene	520,000	240,000	µg/Kg	< 5.0	U
trans-1,2-Dichloroethene	210,000	14,000	µg/Kg	< 5.0	U
trans-1,3-Dichloropropene	NE	NE	µg/Kg	< 5.0	U
Trichloroethene	6,100	3,000	µg/Kg	< 5.0	U
Vinyl Acetate	1,400,000	430,000	µg/Kg	< 10.0	U
Vinyl chloride	830	13	µg/Kg	< 10.0	U
Xylenes (total)	NE	NE	µg/Kg	< 5.0	U

Table 4
Chemical Analytical Data for
Merrillville Borrow Source Material
ACS NPL Site
Griffith, Indiana

Analyte	U.S.EPA Region IX Preliminary Remediation Goals[1]	IDEM RISC Nonresidential Default Closure Levels[2]	Sample Collected / Units	Merrillville Source 7/18/2002 Result	Q
Semi-Volatile Organic Compounds					
1,2,4-Trichlorobenzene	3,000,000	77,000	µg/Kg	< 330	U
1,2-Dichlorobenzene	370,000	270,000	µg/Kg	< 330	U
1,3-Dichlorobenzene	52,000	1,800	µg/Kg	< 330	U
1,4-Dichlorobenzene	8,100	3,400	µg/Kg	< 330	U
2,4,5-Trichlorophenol	88,000,000	690,000	µg/Kg	< 660	U
2,4,6-Trichlorophenol	220,000	5,000	µg/Kg	< 330	U
2,4-Dichlorophenol	2,600,000	3,000	µg/Kg	< 330	U
2,4-Dimethylphenol	18,000,000	25,000	µg/Kg	< 330	U
2,4-Dinitrophenol[3]	1,800,000	820	µg/Kg	< 1,600	U
2,4-Dinitrotoluene	1,800,000	NE	µg/Kg	< 250	U
2,6-Dinitrotoluene	880,000	NE	µg/Kg	< 260	U
2-Chloronaphthalene	27,000,000	NE	µg/Kg	< 330	U
2-Chlorophenol	240,000	10,000	µg/Kg	< 330	U
2-Methylnaphthalene	NE	NE	µg/Kg	< 330	U
2-Methylphenol	44,000,000	39,000	µg/Kg	< 330	U
2-Nitroaniline[3]	50,000	29	µg/Kg	< 1,600	U
2-Nitrophenol	NE	NE	µg/Kg	< 1,600	U
3,3'-Dichlorobenzidine[3]	5,500	210	µg/Kg	< 660	U
3-Nitroaniline	NE	NE	µg/Kg	< 1,600	U
3/4-Methylphenol	NE	33,000	µg/Kg	< 330	U
4,6-Dinitro-2-methylphenol	NE	NE	µg/Kg	< 1,600	U
4-Bromophenyl phenyl ether	NE	NE	µg/Kg	< 330	U
4-Chloro-3-methylphenol	NE	NE	µg/Kg	< 330	U
4-Chloroaniline	3,500,000	2,700	µg/Kg	< 330	U
4-Chlorophenyl phenyl ether	NE	NE	µg/Kg	< 330	U
4-Nitroaniline	NE	NE	µg/Kg	< 1,600	U
4-Nitrophenol	7,000	NE	µg/Kg	< 1,600	U
Acenaphthene	38,000	1,200,000	µg/Kg	< 50	U
Acenaphthylene	NE	NE	µg/Kg	< 50	U
Anthracene	100,000,000	NE	µg/Kg	< 330	U
Benzidine[3]	11	NE	µg/Kg	< 30	U/M
Benzo[a]anthracene	2,900	15,000	µg/Kg	59	
Benzo[a]pyrene	290	1,500	µg/Kg	77	
Benzo[b]fluoranthene	2,900	15,000	µg/Kg	83	
Benzo[g,h,i]perylene	NE	NE	µg/Kg	< 50	U
Benzo[k]fluoranthene	29,000	39,000	µg/Kg	39	
Benzoic acid	100,000,000	1,600,000	µg/Kg	< 330	U
Benzyl alcohol	100,000,000	140,000	µg/Kg	< 330	U
Bis(2-chloroethoxy)methane	NE	NE	µg/Kg	< 330	U
Bis(2-chloroethyl)ether[3]	620	12	µg/Kg	< 330	U
Bis(2-chloroisopropyl)ether[3]	8,100	260	µg/Kg	< 330	U
Bis(2-ethylhexyl)phthalate	180,000	980,000	µg/Kg	< 330	U
Butyl benzyl phthalate	100,000,000	930,000	µg/Kg	< 330	U

Table 4
Chemical Analytical Data for
Merrillville Borrow Source Material
ACS NPL Site
Griffith, Indiana

Analyte	U.S.EPA Region IX Preliminary Remediation Goals[1]	IDEM RISC Nonresidential Default Closure Levels[2]	Sample Collected / Units	Merrillville Source 7/18/2002 Result	Q
Semi-Volatile Organic Compounds					
Carbazole	120,000	20,000	µg/Kg	< 330	U
Chrysene	290,000	25,000	µg/Kg	59	
Di-n-butyl phthalate	NE	2,000,000	µg/Kg	< 330	U
Di-n-octyl phthalate	10,000,000	2,000,000	µg/Kg	< 330	U
Dibenz[a,h]anthracene	290	1,500	µg/Kg	< 20	U
Dibenzofuran	5,100,000	NE	µg/Kg	< 330	U
Diethyl phthalate	100,000,000	1,300,000	µg/Kg	< 330	U
Dimethyl phthalate	100,000,000	1,400,000	µg/Kg	< 330	U
Fluoranthene	30,000,000	880,000	µg/Kg	97	
Fluorene	33,000,000	1,100,000	µg/Kg	< 50	U
Hexachlorobenzene	1,500	3,900	µg/Kg	< 330	U
Hexachlorobutadiene	32,000	44,000	µg/Kg	< 330	U
Hexachloro-cyclopentadiene	5,900,000	2,000,000	µg/Kg	< 330	U
Hexachloroethane	180,000	7,700	µg/Kg	< 330	U
Indeno[1,2,3cd]pyrene	2,900	3,100	µg/Kg	48	
Isophorone	2,600,000	18,000	µg/Kg	< 330	U
N-Nitrosodi-n-propylamine[3]	350	2	µg/Kg	< 35	U/M
N-Nitrosodimethylamine	48	NE	µg/Kg	< 45	U/M
N-Nitrosodiphenylamine	500,000	32,000	µg/Kg	< 330	U
Naphthalene	190,000	170,000	µg/Kg	< 25	U
Nitrobenzene	110,000	340	µg/Kg	< 260	U
Pentachlorophenol	11,000	660	µg/Kg	< 330	U
Phenanthrene	NE	NE	µg/Kg	< 50	U
Phenol	100,000,000	320,000	µg/Kg	< 330	U
Pyrene	54,000,000	570,000	µg/Kg	96	
Pesticides/PCBs					
4,4'-DDD	17	120	mg/Kg	< 0.016	U
4,4'-DDE	12	86	mg/Kg	< 0.016	U
4,4'-DDT	12	86	mg/Kg	< 0.016	U
Aldrin	0.15	0.80	mg/Kg	< 0.008	U
Alpha-BHC	0.59	0.024	mg/Kg	< 0.002	U
Aroclor 1016	29	NE	mg/Kg	< 0.080	U
Aroclor 1221	1	NE	mg/Kg	< 0.080	U
Aroclor 1232	1	NE	mg/Kg	< 0.080	U
Aroclor 1242	1	NE	mg/Kg	< 0.080	U
Aroclor 1248	1	NE	mg/Kg	< 0.080	U
Aroclor 1254	1	NE	mg/Kg	< 0.160	U
Aroclor 1260	1	NE	mg/Kg	< 0.160	U
Beta-BHC	2.1	0.086	mg/Kg	< 0.008	U
Chlordane (alpha)	11	39	mg/Kg	< 0.080	U
Chlordane (gamma)	11	39	mg/Kg	< 0.080	U
delta-BHC	NE	NE	mg/Kg	< 0.008	U
Dieldrin	0.15	0.15	mg/Kg	< 0.016	U
Endosulfan I	NE	NE	mg/Kg	< 0.008	U
Endosulfan II	NE	NE	mg/Kg	< 0.016	U
Endosulfan Sulfate	NE	NE	mg/Kg	< 0.016	U

Table 4
Chemical Analytical Data for
Merrillville Borrow Source Material
ACS NPL Site
Griffith, Indiana

Analyte	U.S.EPA Region IX Preliminary Remediation Goals[1]	IDEM RISC Nonresidential Default Closure Levels[2]	Sample Collected / Units	Merrillville Source 7/18/2002 Result	Q
Pesticides/PCBs					
Endrin	260	15	mg/Kg	< 0.016	U
Endrin Aldehyde	NE	NE	mg/Kg	< 0.016	U
Endrin Ketone	NE	NE	mg/Kg	< 0.016	U
Heptachlor	0.55	1.2	mg/Kg	< 0.008	U
Heptachlor Epoxide	0.27	1	mg/Kg	< 0.008	U
Methoxychlor	4,400	180	mg/Kg	< 0.080	U
Toxaphene	2.2	12	mg/Kg	< 0.160	U
Inorganics					
Aluminum	100,000	NE	mg/Kg	14,500	
Antimony	820	37	mg/Kg	< 1.0	U
Arsenic[4]	2.7	20	mg/Kg	6.8	
Barium	100,000	5,900	mg/Kg	104	
Beryllium	2,200	3,200	mg/Kg	0.6	
Cadmium	810	77	mg/Kg	< 0.1	U
Calcium	NE	NE	mg/Kg	5,220	
Chromium	450	10,120	mg/Kg	20.1	
Cobalt	100,000	NE	mg/Kg	9.1	
Copper	76,000	1,700	mg/Kg	13.4	
Cyanide, Total	35	NE	mg/Kg	< 0.10	U
Iron	100,000	NE	mg/Kg	21,000	
Lead	750	230	mg/Kg	21.1	
Magnesium	NE	NE	mg/Kg	4,540	
Manganese	32,000	NE	mg/Kg	464	
Mercury	610	32	mg/Kg	< 0.05	U
Nickel	41,000	2,700	mg/Kg	19.1	
Potassium	NE	NE	mg/Kg	1,910	
Selenium	10,000	53	mg/Kg	1	
Silver	10,000	87	mg/Kg	< 0.1	U
Sodium	NE	NE	mg/Kg	168.0	
Thallium	130	13	mg/Kg	< 1	U
Vanadium	14,000	NE	mg/Kg	25.8	
Zinc	100,000	10,000	mg/Kg	63.2	

Notes:

[1]Industrial Soil Remediation Goals were taken from the U.S.EPA Region IX Preliminary Remediation Goals (PRGs) for Industrial Soils Screening (11/01/00)

[2]Nonresidential Default Closure Levels were taken from the IDEM Risk Integrated System of Closure (RISC) (2/15/01)

[3]The typical laboratory reporting limits for six SVOC compounds exceed the IDEM RISC guidline values. However, becauses the reporting limits for each of these compounds is lower than the Region IX PRGs, the material was found acceptable for on site use. In the case of benzidine, the reporting limit exceeds the Region IX PRGs and IDEM has not established a threshold value for this compound

[4]Arsenic value for sample exceeds Region IX PRGs, however comparison with the regional background range (1.1 to 24 mg/kg) determined in a study published by the IEPA (1994) indicates that data from this site is below the upper limit of the published regional background concentration range See further discussion in text

NE -- Not Established
NA -- Not Analyzed
U -- Non-detect
J -- Analyte was detected between the Method Detection Limit (MDL) and the Reporting Limit (RL)
M -- the reporting limit for this compound is based upon the laboratory's Method Detection Limit and represents the lowest reporting limit possible by the laboratory
µg/Kg -- micrograms per kilogram (or ppb)
mg/Kg -- milligrams per kilogram (or ppm)

Table 5
Geotechnical Testing Results of Borrow Source Material
ACS NPL Site
Griffith, Indiana

Geotechnical Test Description	Specified Method	Testing Frequency	Units	Sample		
				Reference No. 1 Wetland Sand	Reference No. 2 Merrillville Source	Reference No. 4 Griffith Source
Soil Classification	USCS System	1 test every 5,000 cubic yards	n/a	Grayish brown fine sand, trace gravel and silt	Dark gray, trace black sandy lean clay	Dark gray, black sandy clay
Grain Size Analysis	ASTM D422	1 test every 5,000 cubic yards	% + 3 inches	NR	0.0	0.0
			% Gravel	NR	0.6	1.4
			% Sand	NR	32.4	30.8
			% Silt	NR	52.3	54.1
			% Clay	NR	14.7	13.7
Grain Size Analysis	ASTM D1140	1 test every 5,000 cubic yards	% Fines	NR	64.3	67.3
Optimum Moisture Content	ASTM D2216	1 test every 5,000 cubic yards	%	11.0	17.5	21.5
Atterberg Limits	ASTM D4138	1 test every 5,000 cubic yards	Liquid Limit, L_L	NR	31	31
			Plastic Limit, P_L	NR	19	20
			Plasticity Index, P_I	NR	12	11
Moisture-Density Curve/Proctor Density	ASTM D698	1 test every 5,000 cubic yards & all changes in material	lbs./ft.^{3}	109.0	107.5	97.0
Specific Gravity	ASTM D854	1 test every 5,000 cubic yards & all changes in material	n/a	NR	2.58	2.43
Coefficient of Permeability	ASTM D5084	1 test every 5,000 cubic yards & all changes in material	cm/sec	NR	1.5×10^{-8}	7.8×10^{-6}

Notes

NR = not required because material was not imported to Site

Table 6
Root Zone and Topsoil Moisture and Compaction Test Results
Off-Site Final Engineered Cover
ACS, NPL Site
Griffith, Indiana

Sampling Location	Date Tested	Material	Probe Depth (inches)	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Specification, % Moisture	Specification, % Proctor	Pass/ Fail
1	9/10/2002	Material Number 1[1]	6	102.0	10.8	109.0	93.6	NA	80.0	Pass
2	9/11/2002	Material Number 1[1]	6	110.3	12.5	109.0	101.2	NA	80.0	Pass
3	9/10/2002	Material Number 1[1]	6	107.6	11.9	109.0	98.7	NA	80.0	Pass
4	9/10/2002	Material Number 1[1]	6	102.3	12.1	109.0	93.9	NA	80.0	Pass
5	9/11/2002	Material Number 1[1]	6	109.1	13.4	109.0	100.1	NA	80.0	Pass
6	9/11/2002	Material Number 1[1]	6	116.2	14.0	109.0	106.6	NA	80.0	Pass
7	9/11/2002	Material Number 1[1]	6	111.3	13.6	109.0	102.1	NA	80.0	Pass
8	9/11/2002	Material Number 1[1]	6	110.0	10.0	109.0	100.9	NA	80.0	Pass
9	9/12/2002	Material Number 1[1]	6	114.5	8.4	109.0	105.0	NA	80.0	Pass
10	9/12/2002	Material Number 1[1]	6	110.4	9.1	109.0	101.3	NA	80.0	Pass
11	9/12/2002	Material Number 1[1]	6	115.9	6.2	109.0	106.3	NA	80.0	Pass
12	9/12/2002	Material Number 1[1]	6	116.7	7.7	109.0	107.1	NA	80.0	Pass
13	9/12/2002	Material Number 1[1]	6	113.0	6.4	109.0	103.7	NA	80.0	Pass
14	9/12/2002	Material Number 1[1]	6	115.9	5.1	109.0	106.3	NA	80.0	Pass
15	9/12/2002	Material Number 1[1]	6	117.1	4.9	109.0	107.4	NA	80.0	Pass
16	9/12/2002	Material Number 1[1]	6	116.4	4.0	109.0	106.8	NA	80.0	Pass
17	9/16/2002	Material Number 2	6	92.6	18.8	107.5	86.1	15.5 - 19.5	80.0	Pass
18	9/16/2002	Material Number 2	6	96.9	17.7	107.5	90.1	15.5 - 19.5	80.0	Pass
19	9/16/2002	Material Number 2	6	89.4	17.9	107.5	83.2	15.5 - 19.5	80.0	Pass
20	9/16/2002	Material Number 2	6	94.7	18.3	107.5	88.1	15.5 - 19.5	80.0	Pass
21	9/16/2002	Material Number 2	6	90.0	19.3	107.5	83.7	15.5 - 19.5	80.0	Pass
22	9/26/2002	Material Number 2	6	97.9	19.0	107.5	91.1	15.5 - 19.5	80.0	Pass
23	9/27/2002	Material Number 2	6	86.9	17.7	107.5	80.8	15.5 - 19.5	80.0	Pass
24	9/26/2002	Material Number 2	6	99.0	18.0	107.5	92.1	15.5 - 19.5	80.0	Pass
25	9/24/2002	Material Number 2	6	96.1	18.2	107.5	89.4	15.5 - 19.5	80.0	Pass
26	9/24/2002	Material Number 2	6	92.0	18.2	107.5	85.6	15.5 - 19.5	80.0	Pass
27	9/24/2002	Material Number 2	6	87.3	17.5	107.5	81.2	15.5 - 19.5	80.0	Pass
28	9/24/2002	Material Number 2	6	99.4	18.1	107.5	92.5	15.5 - 19.5	80.0	Pass
29	9/24/2002	Material Number 2	6	92.3	18.2	107.5	85.9	15.5 - 19.5	80.0	Pass
30	9/26/2002	Material Number 2	6	95.7	17.6	107.5	89.0	15.5 - 19.5	80.0	Pass
31	9/24/2002	Material Number 2	6	94.5	15.7	107.5	87.9	15.5 - 19.5	80.0	Pass
32	9/24/2002	Material Number 2	6	92.9	17.5	107.5	86.4	15.5 - 19.5	80.0	Pass
33	9/24/2002	Material Number 2	6	93.3	17.5	107.5	86.8	15.5 - 19.5	80.0	Pass
34	9/26/2002	Material Number 1[1]	6	102.0	11.9	109.0	93.6	NA	80.0	Pass
35	9/24/2002	Material Number 2	6	87.3	15.6	107.5	81.2	15.5 - 19.5	80.0	Pass
36	9/30/2002	Material Number 3[2]	6	85.3	19.8	97.0	87.9	19.5 - 23.5	80.0	Pass
37	9/26/2002	Material Number 3[2]	6	91.8	23.4	97.0	94.6	19.5 - 23.5	80.0	Pass
38	9/30/2002	Material Number 3[2]	6	92.8	20.4	97.0	95.7	19.5 - 23.5	80.0	Pass
39	9/30/2002	Material Number 3[2]	6	89.1	19.9	97.0	91.9	19.5 - 23.5	80.0	Pass
40	9/30/2002	Material Number 3[2]	6	89.3	19.7	97.0	92.1	19.5 - 23.5	80.0	Pass
41	9/30/2002	Material Number 3[2]	6	89.0	19.9	97.0	91.8	19.5 - 23.5	80.0	Pass
42	9/26/2002	Material Number 3[2]	6	88.4	20.2	97.0	91.1	19.5 - 23.5	80.0	Pass
43	9/30/2002	Material Number 3[2]	6	92.6	22.0	97.0	95.5	19.5 - 23.5	80.0	Pass
44	10/1/2002	Material Number 3[2]	6	84.3	22.0	97.0	86.9	19.5 - 23.5	80.0	Pass
45	10/1/2002	Material Number 3[2]	6	92.1	23.4	97.0	94.9	19.5 - 23.5	80.0	Pass

Table 6
Root Zone and Topsoil Moisture and Compaction Test Results
Off-Site Final Engineered Cover
ACS, NPL Site
Griffith, Indiana

Sampling Location	Date Tested	Material	Probe Depth (inches)	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Specification, % Moisture	Specification, % Proctor	Pass/ Fail
46	9/30/2002	Material Number 3[2]	6	78.8	21.1	97.0	81.2	19.5 - 23.5	80.0	Pass
47	10/1/2002	Material Number 3[2]	6	78.8	21.7	97.0	81.2	19.5 - 23.5	80.0	Pass
48	9/30/2002	Material Number 3[2]	6	78.0	21.0	97.0	80.4	19.5 - 23.5	80.0	Pass
49	9/27/2002	Material Number 3[2]	6	90.7	19.8	97.0	93.5	19.5 - 23.5	80.0	Pass
50	9/30/2002	Material Number 3[2]	6	87.1	20.6	97.0	89.8	19.5 - 23.5	80.0	Pass
51	10/1/2002	Material Number 3[2]	6	86.1	23.2	97.0	88.8	19.5 - 23.5	80.0	Pass
52	10/1/2002	Material Number 3[2]	6	94.2	21.6	97.0	97.1	19.5 - 23.5	80.0	Pass
53	9/30/2002	Material Number 3[2]	6	83.0	20.1	97.0	85.6	19.5 - 23.5	80.0	Pass
54	9/30/2002	Material Number 3[2]	6	88.8	20.2	97.0	91.5	19.5 - 23.5	80.0	Pass
56[3]	10/1/2002	Material Number 3[2]	6	92.2	23.5	97.0	95.1	19.5 - 23.5	80.0	Pass

Notes

Tests were conducted by K&S Soil & Environmental Consultants using a nuclear density testing unit (ASTM D2922).

1 It was determined that the Wetland Sand material had a wider moisture range because of the nature of the material. Test location #34 was initially tested as Merrillville Source material, however was later determined through field investigation to be Wetland Sand material.

2 The soil obtained from the Griffith, IN source met the requirements for root zone material and topsoil material, therefore, it was used for both

3 Test location #55 was not used

The in-place test locations are shown on Figure 5.

NA = Not Applicable

Table 7
Root Zone Sand Cone Test Results
Off-Site Final Engineered Cover
ACS, NPL Site
Griffith, Indiana

Sampling Location	Date Tested	Material	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Specification, % Moisture	Specification, % Proctor	Pass/ Fail
1	9/10/2002	Material Number 1	89.3	7.4	109.0	81.9	NA	80.0	Pass
22	9/11/2002	Material Number 2	92.3	18.6	107.5	85.9	15.5-19.5	80.0	Pass
44	9/10/2002	Material Number 3	83.8	20.9	97.0	86.4	19.5-23.5	80.0	Pass

Notes

NA - Not applicable MWH Engineers determined that moisture has little affect on sand compaction, therefore this material was given a wide range for the moisture content.

Tests were conducted by K&S Soil & Environmental Consultants using a the sand cone method (ASTM D698)

The in-place test locations are shown on Figure 5

Table 8
Depth of Root Zone and Topsoil Material
ACS NPL Site
Griffith, Indiana

Point No.	Survey Point Location	Northing	Easting	Top of Clay Elevation	Top of Root Zone Elevation	Root Zone Thickness (ft.)	Top of Topsoil Elevation	Topsoil Thickness (ft.)	Total Soil Cover Thickness (ft.)
100	Edge	6443.79	5163.42	636.89	636.83	-0.06	637.60	0.77	0.72
103	Edge	6373.94	5338.41	645.64	646.33	0.69	646.83	0.50	1.19
104	Edge	6350.06	5396.18	645.63	646.14	0.51	646.84	0.70	1.21
105	Edge	6322.83	5456.66	642.80	643.43	0.63	644.11	0.68	1.31
106	Edge	6308.95	5453.97	642.42	644.19	1.77	644.48	0.29	2.06
107	Edge	6298.22	5464.73	641.86	643.58	1.72	643.92	0.34	2.07
108	Edge	6228.63	5455.01	642.31	643.28	0.97	643.65	0.37	1.34
109	Edge	6166.23	5433.97	642.46	643.84	1.37	644.18	0.34	1.71
110	Edge	6100.16	5419.02	643.12	644.10	0.98	644.60	0.49	1.48
111	Edge	6033.51	5406.54	644.78	645.90	1.12	646.00	0.10	1.22
112	Edge	5971.25	5385.45	647.15	648.17	1.02	648.74	0.57	1.59
113	Edge	5946.61	5379.77	648.27	NS	NS	NS	NS	NS
187	Edge	6443.39	5163.73	636.93	NS	NS	NS	NS	NS
188	Edge	6404.55	5165.33	637.17	637.54	0.38	637.66	0.11	0.49
189	Edge	6375.05	5156.65	637.34	NS	NS	NS	NS	NS
190	Edge	6342.87	5138.67	637.68	637.32	-0.35	637.81	0.49	0.14
192	Edge	6307.76	5110.67	637.52	637.59	0.08	637.55	-0.04	0.03
193	Edge	6248.35	5087.93	638.50	638.97	0.47	639.58	0.62	1.09
194	Edge	6203.27	5069.72	639.36	639.77	0.40	640.29	0.53	0.93
196	Edge	6151.19	5048.40	639.95	640.00	0.05	640.98	0.98	1.03
197	Edge	6092.30	5025.37	640.40	640.44	0.04	641.07	0.62	0.67
200	Interior	6075.62	5045.71	642.58	643.50	0.93	644.10	0.60	1.52
201	Interior	6059.24	5105.05	645.03	646.10	1.07	646.50	0.40	1.46
202	Interior	6044.26	5150.27	647.37	648.18	0.81	648.90	0.72	1.53
203	Interior	6027.88	5198.13	648.55	649.85	1.29	650.38	0.53	1.83
204	Interior	6015.76	5255.17	649.89	651.57	1.68	651.57	0.00	1.68
205	Interior	5995.19	5312.19	647.62	649.21	1.59	649.29	0.08	1.67
206	Interior	5976.23	5364.45	646.88	648.25	1.37	648.79	0.54	1.91
207	Interior	6029.32	5380.72	644.97	646.03	1.06	646.50	0.47	1.53
208	Interior	6047.82	5330.90	646.52	647.67	1.15	648.31	0.64	1.78
209	Interior	6064.70	5286.80	648.06	649.39	1.33	649.67	0.29	1.61
210	Interior	6081.13	5229.06	648.98	650.12	1.14	650.61	0.49	1.63
211	Interior	6094.96	5167.36	646.71	648.02	1.32	648.17	0.15	1.46
212	Interior	6112.06	5112.50	644.74	645.55	0.81	646.24	0.69	1.50
213	Interior	6133.54	5057.14	641.70	642.50	0.80	643.08	0.58	1.38
214	Interior	6191.39	5080.68	640.86	642.07	1.22	642.67	0.60	1.82
215	Interior	6175.79	5124.11	643.84	645.27	1.43	645.74	0.47	1.90
216	Interior	6153.78	5182.30	647.00	648.39	1.38	648.62	0.24	1.62
217	Interior	6133.28	5238.11	648.76	649.78	1.01	650.12	0.34	1.35
218	Interior	6107.89	5294.29	647.70	648.99	1.29	649.55	0.56	1.84
219	Interior	6084.20	5345.26	645.93	646.60	0.67	647.40	0.80	1.47
220	Interior	6067.74	5389.82	643.90	644.98	1.08	645.59	0.61	1.68
221	Interior	6122.89	5401.20	643.38	644.40	1.03	644.82	0.42	1.44
222	Interior	6144.59	5355.93	645.98	646.84	0.86	647.64	0.80	1.66
223	Interior	6163.06	5301.80	647.79	648.89	1.10	649.35	0.46	1.56
224	Interior	6186.47	5245.35	648.25	649.59	1.34	649.68	0.08	1.43
225	Interior	6209.78	5183.86	646.67	647.84	1.18	648.11	0.27	1.44
226	Interior	6231.18	5123.19	642.52	643.64	1.12	644.03	0.39	1.51
227	Interior	6243.69	5097.62	639.69	640.65	0.96	641.28	0.63	1.59
317	Edge	6086.60	5022.94	640.30	639.28	-1.02	641.22	1.93	0.91
318	Edge	6044.05	5015.93	641.16	640.49	-0.67	641.66	1.17	0.50
319	Edge	5984.54	5020.80	642.12	640.87	-1.25	642.50	1.63	0.38
320	Edge	5920.22	5025.01	643.39	643.44	0.05	644.02	0.58	0.62
321	Edge	5855.62	5020.43	644.47	644.62	0.14	645.39	0.78	0.92
322	Edge	5793.43	5004.88	644.97	645.43	0.46	645.73	0.30	0.76
323	Edge	5760.57	4993.64	646.04	646.06	0.02	646.11	0.05	0.07

Table 8
Depth of Root Zone and Topsoil Material
ACS NPL Site
Griffith, Indiana

Point No.	Survey Point Location	Northing	Easting	Top of Clay Elevation	Top of Root Zone Elevation	Root Zone Thickness (ft.)	Top of Topsoil Elevation	Topsoil Thickness (ft.)	Total Soil Cover Thickness (ft.)
324	Edge	5720.88	4996.79	646.98	645.41	-1.57	647.76	2.35	0.78
325	Edge	5697.48	5017.77	647.20	646.09	-1.11	647.85	1.76	0.65
327	Edge	5685.15	5040.11	647.88	646.00	-1.88	648.47	2.46	0.58
328	Edge	5681.54	5064.56	648.56	648.66	0.09	648.86	0.20	0.30
329	Edge	5679.89	5112.29	649.59	649.61	0.02	649.99	0.38	0.40
330	Edge	5679.06	5171.55	650.73	650.82	0.10	651.38	0.56	0.66
331	Edge	5676.98	5233.62	651.58	651.80	0.21	652.22	0.43	0.64
332	Edge	5678.61	5295.68	652.03	652.06	0.03	652.48	0.42	0.46
333	Edge	5680.81	5308.07	652.12	652.14	0.02	653.03	0.90	0.91
334	Edge	5713.60	5338.16	652.93	654.04	1.11	654.51	0.47	1.58
335	Edge	5771.07	5363.86	652.89	654.40	1.51	654.89	0.49	2.00
336	Edge	5831.67	5382.90	652.31	653.91	1.59	654.31	0.41	2.00
337	Edge	5853.09	5394.30	651.69	652.92	1.22	653.18	0.26	1.49
338	Edge	5896.24	5395.45	650.35	650.96	0.62	651.32	0.36	0.97
339	Edge	5936.71	5377.73	648.69	649.52	0.83	650.04	0.52	1.35
340	Edge	5973.45	5385.62	646.99	648.06	1.08	648.69	0.63	1.70
228	Interior	6296.80	5125.74	638.79	639.87	1.08	640.36	0.48	1.57
229	Interior	6281.98	5167.74	644.04	644.55	0.50	645.47	0.92	1.43
230	Interior	6259.92	5224.10	646.79	647.73	0.94	648.43	0.70	1.64
231	Interior	6237.15	5275.03	647.78	648.91	1.13	649.18	0.27	1.40
232	Interior	6212.02	5332.61	647.33	648.64	1.31	648.96	0.32	1.63
233	Interior	6193.52	5372.05	646.56	647.38	0.82	648.09	0.71	1.53
234	Interior	6175.77	5414.64	643.94	644.84	0.90	645.51	0.67	1.57
235	Interior	6232.38	5428.91	643.72	644.85	1.13	645.48	0.63	1.76
236	Interior	6250.15	5389.94	646.55	647.52	0.97	647.97	0.44	1.42
237	Interior	6272.28	5334.18	646.72	647.77	1.06	648.34	0.57	1.62
238	Interior	6290.73	5274.23	645.55	646.74	1.19	647.36	0.62	1.80
239	Interior	6310.22	5213.63	642.70	643.66	0.96	644.47	0.81	1.77
240	Interior	6329.42	5171.92	638.75	640.47	1.72	641.10	0.63	2.35
241	Interior	6341.60	5149.65	638.03	638.97	0.94	639.79	0.82	1.76
242	Interior	6393.16	5179.93	638.11	639.52	1.42	639.80	0.28	1.69
243	Interior	6376.70	5225.14	640.07	641.71	1.64	642.36	0.65	2.29
244	Interior	6349.14	5284.10	644.27	645.40	1.13	645.71	0.31	1.44
245	Interior	6324.12	5336.09	645.83	646.79	0.96	647.18	0.39	1.35
246	Interior	6296.16	5386.71	646.03	646.91	0.89	647.48	0.57	1.45
247	Interior	6283.42	5416.88	645.19	645.74	0.55	646.77	1.03	1.58
248	Interior	6271.41	5444.58	642.78	644.26	1.48	644.73	0.47	1.96
317	Edge	6086.60	5022.94	640.30	639.28	-1.02	641.22	1.93	0.91
318	Edge	6044.05	5015.93	641.16	640.49	-0.67	641.66	1.17	0.50
319	Edge	5984.54	5020.80	642.12	640.87	-1.25	642.50	1.63	0.38
320	Edge	5920.22	5025.01	643.39	643.44	0.05	644.02	0.58	0.62
321	Edge	5855.62	5020.43	644.47	644.62	0.14	645.39	0.78	0.92
322	Edge	5793.43	5004.88	644.97	645.43	0.46	645.73	0.30	0.76
323	Edge	5760.57	4993.64	646.04	646.06	0.02	646.20	0.14	0.16
324	Edge	5720.88	4996.79	646.98	645.41	-1.57	647.57	2.16	0.59
325	Edge	5697.48	5017.77	647.20	646.09	-1.11	647.71	1.63	0.51
327	Edge	5685.15	5040.11	647.88	646.00	-1.88	648.48	2.48	0.60
328	Edge	5681.54	5064.56	648.56	648.66	0.09	648.85	0.19	0.29
392	Interior	5780.57	5006.83	646.41	NS	NS	NS	NS	NS
329	Edge	5679.89	5112.29	649.59	649.61	0.02	649.92	0.32	0.33
330	Edge	5679.06	5171.55	650.73	650.82	0.10	651.26	0.43	0.53
331	Edge	5676.98	5233.62	651.58	651.80	0.21	652.11	0.32	0.53
332	Edge	5678.61	5295.68	652.03	652.06	0.03	652.43	0.37	0.40
333	Edge	5680.81	5308.07	652.12	652.14	0.02	652.92	0.78	0.80
398	Interior	5684.96	5301.20	652.26	653.60	1.34	653.69	0.09	1.43
334	Edge	5713.60	5338.16	652.93	654.04	1.11	654.49	0.45	1.56

Table 8
Depth of Root Zone and Topsoil Material
ACS NPL Site
Griffith, Indiana

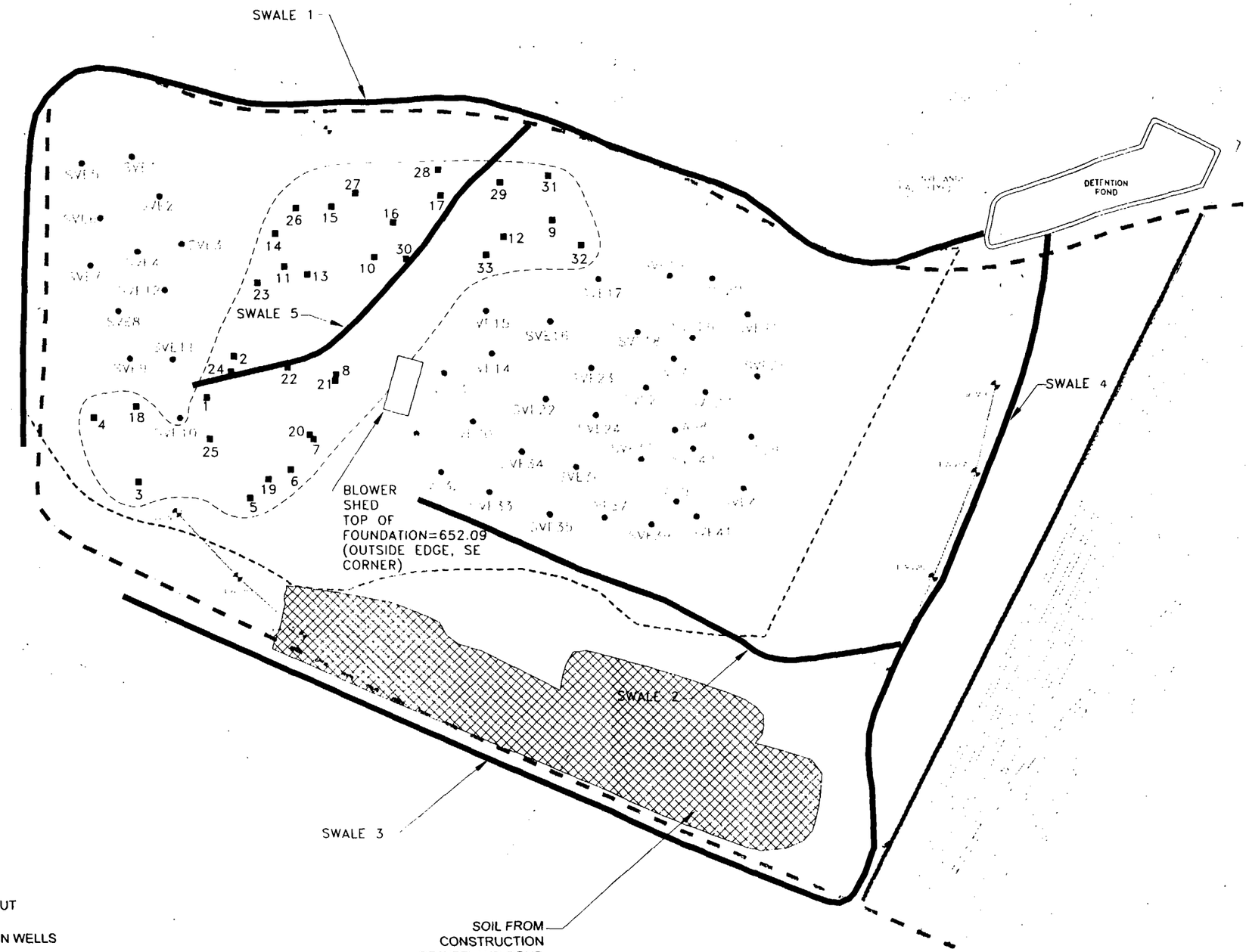
Point No.	Survey Point Location	Northing	Easting	Top of Clay Elevation	Top of Root Zone Elevation	Root Zone Thickness (ft.)	Top of Topsoil Elevation	Topsoil Thickness (ft.)	Total Soil Cover Thickness (ft.)
101	Edge	6429.22	5229.81	639.85	640.89	1.04	640.89	-0.01	1.03
102	Edge	6402.24	5284.91	643.44	644.32	0.88	644.43	0.11	0.99
335	Edge	5771.07	5363.86	652.89	654.40	1.51	654.89	0.49	2.00
336	Edge	5831.67	5382.90	652.31	653.91	1.59	654.36	0.45	2.05
337	Edge	5853.09	5394.30	651.69	652.92	1.22	654.35	1.43	2.66
338	Edge	5896.24	5395.45	650.35	650.96	0.62	653.19	2.23	2.84
339	Edge	5936.71	5377.73	648.69	649.52	0.83	651.33	1.82	2.64
340	Edge	5973.45	5385.62	646.99	648.06	1.08	650.04	1.98	3.05
357	Interior	5954.10	5331.43	648.26	649.41	1.15	649.66	0.25	1.40
358	Interior	5976.28	5269.16	649.81	651.36	1.54	651.61	0.25	1.79
359	Interior	5996.46	5207.30	649.04	650.28	1.24	651.10	0.82	2.06
360	Interior	6014.52	5148.54	647.93	649.03	1.10	649.28	0.25	1.35
361	Interior	6037.74	5087.61	644.87	646.16	1.29	646.56	0.40	1.69
362	Interior	6055.37	5035.32	642.56	643.27	0.72	644.14	0.87	1.59
363	Interior	5996.33	5029.81	643.58	644.43	0.85	645.13	0.70	1.55
364	Interior	5980.65	5077.23	646.29	647.25	0.96	647.73	0.47	1.44
365	Interior	5963.06	5133.62	648.25	649.40	1.15	650.20	0.80	1.96
366	Interior	5941.77	5190.62	649.59	650.84	1.25	651.27	0.43	1.68
367	Interior	5923.00	5246.34	649.66	651.04	1.38	651.53	0.49	1.87
368	Interior	5901.38	5304.38	650.73	651.27	0.54	652.27	1.00	1.54
369	Interior	5880.16	5358.90	651.30	652.22	0.91	652.77	0.55	1.47
370	Interior	5871.80	5384.95	651.23	652.34	1.11	652.81	0.47	1.58
372	Interior	5829.98	5332.04	652.35	653.54	1.19	654.11	0.57	1.76
373	Interior	5851.22	5274.91	651.34	652.22	0.88	653.02	0.80	1.68
374	Interior	5872.04	5215.05	650.61	651.50	0.89	651.96	0.46	1.35
375	Interior	5893.82	5155.48	650.06	650.95	0.90	651.75	0.80	1.69
376	Interior	5916.26	5098.21	648.31	649.03	0.72	649.72	0.69	1.41
377	Interior	5937.08	5043.88	644.54	646.05	1.51	646.24	0.18	1.69
378	Interior	5869.73	5031.90	644.47	645.92	1.45	646.37	0.45	1.90
379	Interior	5857.05	5068.97	645.94	648.46	2.52	648.60	0.14	2.65
380	Interior	5836.78	5119.05	649.96	650.88	0.92	651.41	0.53	1.45
381	Interior	5817.46	5175.26	650.24	651.56	1.32	652.07	0.51	1.83
382	Interior	5795.33	5232.83	650.58	652.33	1.75	652.80	0.47	2.22
383	Interior	5774.06	5287.95	652.29	653.80	1.51	654.71	0.91	2.42
384	Interior	5753.42	5342.05	653.00	654.44	1.44	655.16	0.72	2.16
387	Interior	5711.15	5287.71	653.37	654.26	0.89	654.83	0.57	1.46
388	Interior	5729.79	5227.74	652.18	653.44	1.26	653.89	0.44	1.71
389	Interior	5747.10	5168.77	651.51	652.60	1.10	653.09	0.49	1.58
390	Interior	5755.90	5112.83	650.81	651.88	1.07	652.32	0.44	1.51
391	Interior	5767.43	5052.81	648.00	649.33	1.33	650.31	0.98	2.31
393	Interior	5725.98	5002.92	647.13	648.28	1.15	648.59	0.31	1.46
394	Interior	5708.45	5062.86	649.17	650.22	1.05	650.80	0.58	1.63
395	Interior	5700.07	5124.15	650.69	651.55	0.86	652.09	0.54	1.40
396	Interior	5694.59	5176.91	651.36	652.43	1.07	652.82	0.39	1.46
397	Interior	5688.65	5237.48	652.02	652.99	0.97	653.49	0.51	1.47

Notes:

NS - Not Surveyed

Because the Top of Clay survey was performed prior to removing the erosion control blanket and regrading eroded soils, several locations have "negative" thicknesses. This was caused by a change in the initial elevations at these locations after regrading was performed. Further discussion is presented in Section 5.5 of this report.

FIGURES



LEGEND:

- DRAINAGE SWALE
- BWES TRENCHES
- PERIMETER BARRIER WALL
- DELINEATION OF FML COVER
- SEPARATION BARRIER WALL
- EXTRACTION WELL OR CLEANOUT
- IN-SITU SOIL VAPOR EXTRACTION WELLS
- AIR SPARGE WELLS
- APPROXIMATE CLAY COMPACTION TEST LOCATIONS
- APPROXIMATE EXTENT OF PCB-IMPACTED MATERIAL AND RECOMPACTED CLAY

REV	DATE	BY		SCALE	DESIGNED	JDP	SUBMITTED BY			MWH	ACS RD/RA GROUP AMERICAN CHEMICAL SERVICE SUPERFUND SITE GRIFFITH, INDIANA	EXTENT OF RELOCATION ACTIVITIES	FIGURE
				AS SHOWN	DRAWN	MM	ROBERT A. ADAMS (PROJECT MANAGER)	LICENSE NO	DATE				1
					CHECKED	RAA	PETER J. VAN (COMPANY OFFICER)	LICENSE NO	DATE				

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SWALE 5

BLOWER SHED

3
FIG. 3

LEGEND:

- ⊛ DENOTES IN-SITU SOIL VAPOR EXTRACTION WELL
- 650.00 DENOTES SPOT ELEVATION COLLECTED ON 08-27-02
- ——— DENOTES CONTOURS FROM BASELINE TOPOGRAPHY
- — · — EXTENT OF FML COVER AREA
- – – – – APPROXIMATE EXTENT OF RECOMPACTED CLAY

0 30 60
SCALE IN FEET

REV	DATE	BY	DESCRIPTION

DESIGNED JDP
DRAWN MM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO DATE
PETER J. VAGT (COMPANY OFFICER) LICENSE NO DATE

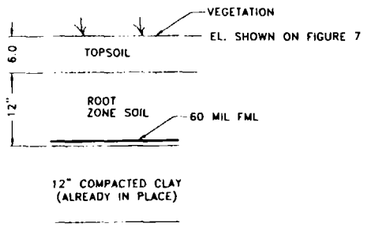
MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

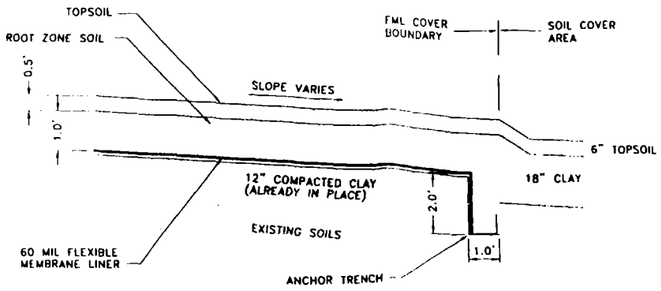
TOP OF CLAY ELEVATION

FIGURE 2

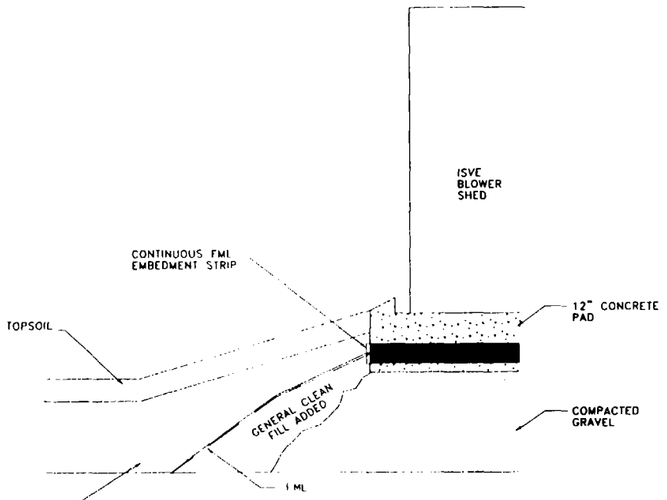
J:\209\0601 ACS\0119 Final Off-Site Cover\Revised ECI Figures\Top of Clay.dwg, 05/10/2004 07:42:41 AM



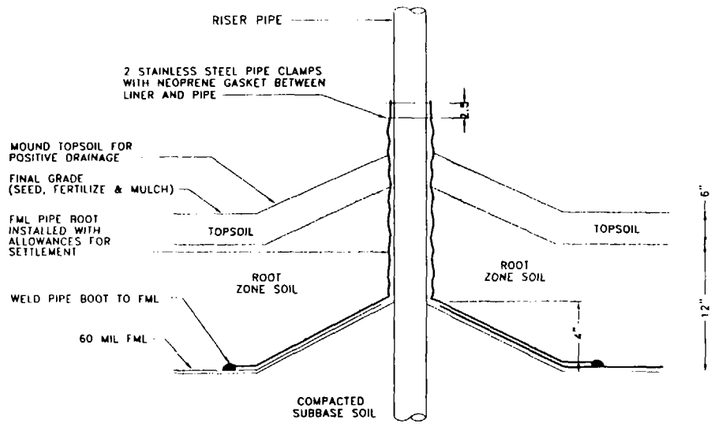
OFF-SITE AREA TYPICAL FML COVER SYSTEM — 1
NOT TO SCALE — FIG. 7



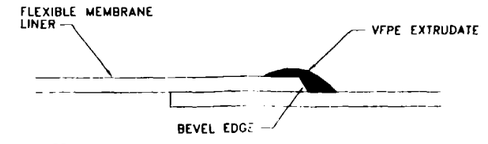
TYPICAL OFCA FML COVER ANCHOR SYSTEM — 2
NOT TO SCALE — FIG. 4



FML CONNECTION TO BLOWER SHED DETAIL — 6
NOT TO SCALE — FIG. 4

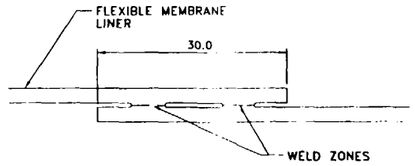


TYPICAL FML PENETRATION DETAIL — 3
NOT TO SCALE — FIG. 2



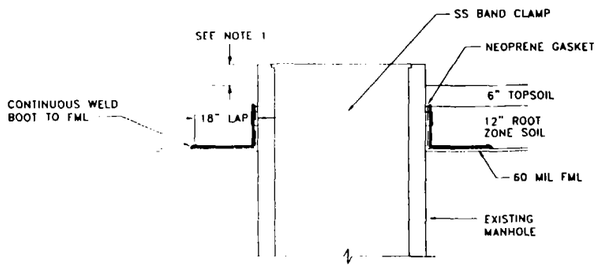
NOTE:
EXTRUSION WELD SURFACES SHALL BE FREE OF DEBRIS AND SCUFFED USING SUITABLE TOOLS.

EXTRUSION FILLET WELD



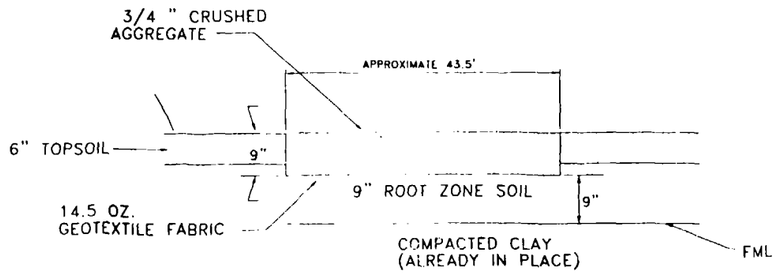
HOT WEDGE WELD

FML LINER WELDS — 5
NOT TO SCALE — FIG. 4



FML CONNECTION TO EXISTING MANHOLES — 4
NOT TO SCALE — –

NOTE:
1. ELEVATION OF MANHOLE TOP TO BE ADJUSTED TO FINAL GRADE PLUS 6".
2. THE SAME FML CONNECTION METHOD TO BE USED FOR CLEANOUT MANHOLES.



TYPICAL ACCESS ROAD SECTION FOR FML AREAS — 7
NOT TO SCALE — FIG. 7

REV	DATE	BY	DESCRIPTION

DESIGNED JDP
DRAWN MM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
PETER J VAGT (COMPANY OFFICER) LICENSE NO. DATE

MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

DETAILS

FIGURE 3

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NOTES:

BASED ON MID AMERICA LINING CO. DRAWING, AND DUNELAND GROUP ENGINEERING & SURVEYING, PROJECT 1676, DRAWING DATED 09/24/02.

SMALL REPAIR SYMBOLS AT THREE CORNERS OF BUILDING REPRESENT EXTRUSION WELD LOCATIONS. NO NON-DESTRUCTIVE TESTING COULD BE PERFORMED AT THOSE LOCATIONS SO THEY ARE NOT LABELED WITH REPAIR NUMBERS.

LEGEND

59	PANEL NUMBER
R-134	REPAIR NUMBER
DS-28	DESTRUCTIVE TEST NUMBER

N=5771.15 E=5001.68
N=5993.07 E=5008.74
N=5814.89 E=5013.83
N=5836.79 E=5018.47
N=5749.20 E=4995.64
N=5858.71 E=5023.56
N=5880.42 E=5026.68
N=5902.45 E=5027.39
N=5924.33 E=5027.51
N=5946.84 E=5025.11
N=5969.04 E=5023.77
N=5991.24 E=5022.11
N=6013.25 E=5021.45
N=6035.42 E=5020.08
N=6057.55 E=5020.33
N=6079.60 E=5023.27
N=6101.55 E=5030.98
N=6123.58 E=5040.09
N=6145.60 E=5046.66
N=6167.62 E=5055.80
N=6189.56 E=5064.28
N=6211.50 E=5072.61
N=6233.37 E=5082.07
N=6255.07 E=5090.26
N=6276.90 E=5100.56
N=6298.44 E=5112.57
N=6363.30 E=5156.94
N=6385.32 E=5162.83
N=6407.20 E=5167.61
N=6429.10 E=5168.76
N=6450.83 E=5163.08
N=5726.91 E=4995.75
N=5704.21 E=5012.74
N=5695.38 E=5341.10
N=5717.03 E=5356.88
N=5738.81 E=5367.16
N=5760.71 E=5376.71
N=5782.23 E=5385.87
N=5804.04 E=5395.16
N=5825.73 E=5403.87
N=5847.38 E=5413.22
N=5869.05 E=5423.32
N=5890.55 E=5436.36
N=5912.47 E=5445.89
N=5935.25 E=5447.48
N=5957.32 E=5445.78
N=5979.63 E=5441.34
N=6001.89 E=5437.66
N=6024.06 E=5433.09
N=6045.94 E=5429.84
N=6068.38 E=5428.47
N=6090.47 E=5429.28
N=6112.62 E=5430.90
N=6134.61 E=5436.57
N=6156.66 E=5442.67
N=6178.1 E=5452.8
N=6199.44 E=5472.29
N=6221.35 E=5479.89
N=6243.50 E=5481.13
N=6265.61 E=5485.32
N=6287.65 E=5488.24
N=6310.27 E=5474.27
N=6333.93 E=5426.94
N=6357.51 E=5380.17
N=6381.40 E=5329.75
N=6404.76 E=5285.79
N=6427.86 E=5240.10
N=645C E=5197

6 FIG. 3
2 FIG. 3
5 FIG. 3

BUILDING

0 15 30
SCALE IN FEET

REV	DATE	BY	DESIGNED JDP	SUBMITTED BY ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO DATE	MWH
			DRAWN MM	PETER J. VAGT (COMPANY OFFICER) LICENSE NO DATE	ACS RD/RA GROUP AMERICAN CHEMICAL SERVICE SUPERFUND SITE GRIFFITH, INDIANA
			CHECKED RAA		FLEXIBLE MEMBRANE LINER EXTENT AND SEAM LOCATIONS

FIGURE 4

J:\209\0601 ACS\0119 Final Off-Site Cover\Revised ECI Figures\LINER AND SEAM LOCATIONS.dwg, 05/10/2004 07:49:01 AM

TEST 8
TEST 9
TEST 23
TEST 24
TEST 48
TEST 56
TEST 6
TEST 10
TEST 18
TEST 4
TEST 55
TEST 27
TEST 28
TEST 54
TEST 52
TEST 53
TEST 11
TEST 7
TEST 22
TEST 25
TEST 12
TEST 19
TEST 26
TEST 29
TEST 46
TEST 50
TEST 5
TEST 13
TEST 3
TEST 20
BLOWER SHED
TEST 30
TEST 45
TEST 47
TEST 49
TEST 2
TEST 14
TEST 21
TEST 31
TEST 15
TEST 44
TEST 48
TEST 1
TEST 35
TEST 16
TEST 32
TEST 33
TEST 17
TEST 42
TEST 43
TEST 36
TEST 41
TEST 34
TEST 37
TEST 38
TEST 39
TEST 40

LEGEND:
- DENOTES SOIL VAPOR EXTRACTION WELL
- DENOTES TEST LOCATIONS FOR COMPACTION
- EXTENT OF FML COVER AREA

N

0 30 60
SCALE IN FEET

REV	DATE	BY	DESCRIPTION

DESIGNED JDP
DRAWN MM
CHECKED RAA

SUBMITTED BY
ROBERT A ADAMS (PROJECT MANAGER) LICENSE NO DATE
PETER J VAGT (COMPANY OFFICER) LICENSE NO DATE

MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

COMPACTION AND MOISTURE TEST LOCATIONS FOR ROOT ZONE AND TOPSOIL MATERIALS

FIGURE 5

J:\209\0601 ACS\0119 Final Off-Site Cover\Revised ECI Figures\Top of Clay.dwg, 05/11/2004 07:18:55 AM

BLOWER SHED

LEGEND:

- DENOTES IN-SITU SOIL VAPOR EXTRACTION WELL
- DENOTES CONTOURS AFTER FIRST FILL LAYER
- 650.00 DENOTES SPOT ELEVATION COLLECTED ON 09-24-02
- EXTENT OF FML COVER AREA

0 30 60
SCALE IN FEET

REV	DATE	BY	DESCRIPTION

DESIGNED JDP
DRAWN MM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO DATE
PETER J. VAGT (COMPANY OFFICER) LICENSE NO DATE

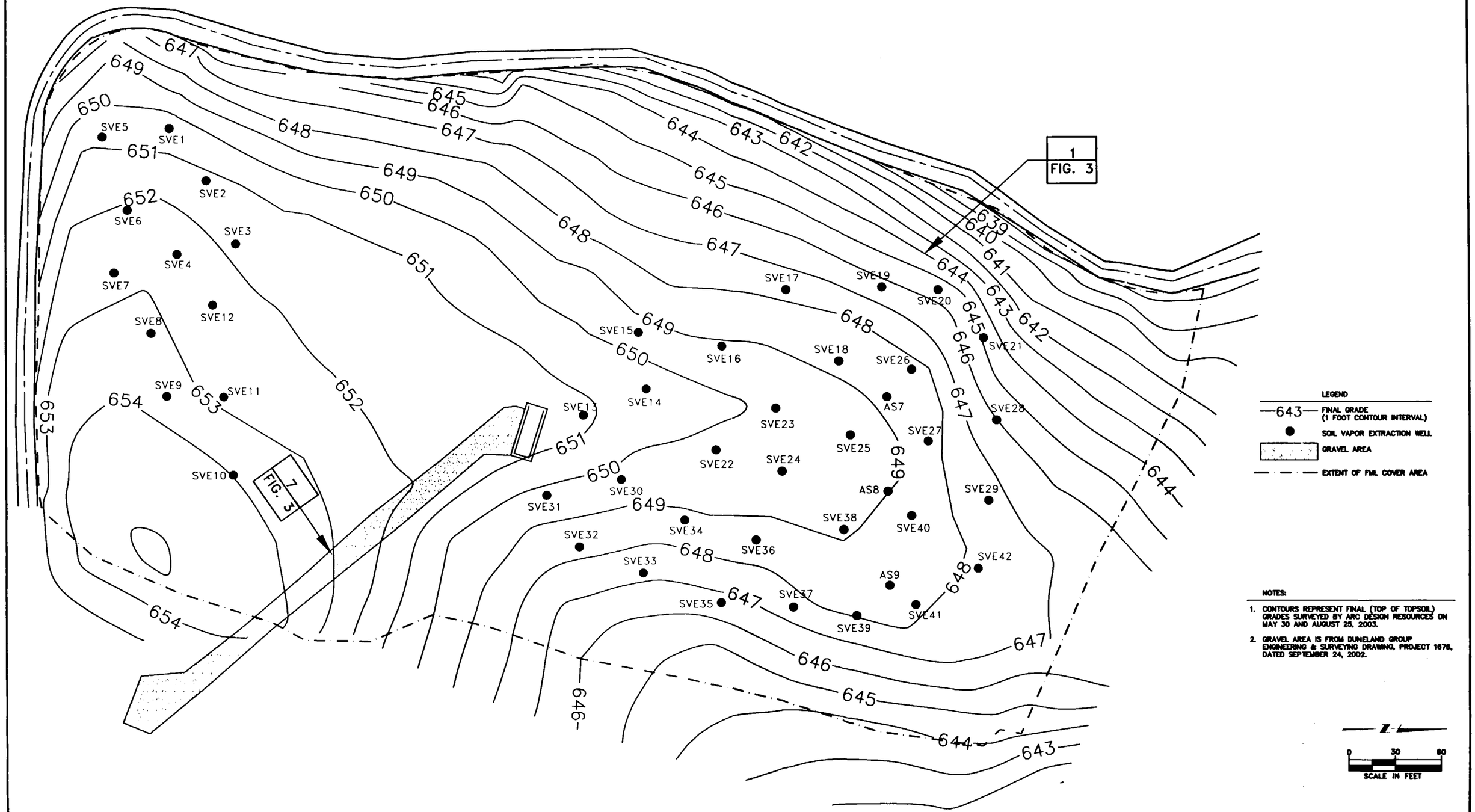
MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

TOP OF ROOT ZONE ELEVATION

FIGURE 6

J:\209\0601 ACS\0119 Final Off-Site Cover\Revised ECI Figures\Top of Clay.dwg, 05/11/2004 01:14:50 PM



REV	DATE	BY	DESCRIPTION	DESIGNED JDP	SUBMITTED BY		
				DRAWN MM	ROBERT A ADAMS (PROJECT MANAGER)	LICENSE NO	DATE
				CHECKED RAA	PETER J VAGT (COMPANY OFFICER)	LICENSE NO	DATE

MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

TOP OF TOPSOIL ELEVATIONS
(SITE AS-BUILT)

FIGURE
7

J:\209\0601 ACS\0119 Final Off-Site Cover\Revised ECI Figures\FINAL GRADES dwg, 05/10/2004 08:00:19 AM

LEGEND:

— · — · — EXTENT OF FML COVER AREA

x 221 INDICATES THE LOCATION AND NUMBER OF THE SURVEY POINT

0 100

SCALE IN FEET

REV	DATE	BY	REVISION	SCALE	DESIGNED	SUBMITTED BY	LICENSE NO	DATE
				AS SHOWN	DRAWN MM	ROBERT A ADAMS (PROJECT MANAGER)		
					CHECKED RAA	PETER J VACT (COMPANY OFFICER)	LICENSE NO	DATE

MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

SURVEY LOCATIONS

FIGURE 8

J:\209\0601 ACS\0119 Final Off-Site Cover\Drawings\R F B\Survey Locations.dwg, 06/08/2004 08:15:49 AM

APPENDIX A

CHRONOLOGICAL SUMMARY OF CONSTRUCTION ACTIVITIES

A CHRONOLOGICAL SUMMARY OF CONSTRUCTION ACTIVITIES

This section summarizes the major construction activities performed and equipment used during the completion of the tasks outlined in this CCR. Weekly construction progress meetings were held throughout the project.

Week of June 21, 2002
MEI began the maintenance work planned prior to the installation of the final cover, including the installation of protective concrete structures around piezometers and extraction trench cleanouts.

Week of July 7, 2002 through Week of July 28, 2002
MEI completed the maintenance work began in June.

Week of July 22, 2002
MEI mobilized to the Site on July 22 to relocate PCB material from the On-Site Area, near the former Fire Pond, to drainage Swale 5 in the Off-Site Area. An initial project kickoff and health and safety meeting was held on July 22 for the partial crew mobilized first. A larger project kickoff and health and safety meeting was held on July 23 for the entire crew. The PCB-impacted soil, excavated from the wetlands located west of the GWTP during the summer and fall of 2001, had been used to fill in the Fire Pond. MEI removed 12-inches of clay in the area of Swale 5 and placed this excess wetland material in Swale 5.

MEI raises manholes at extraction wells EW-12 and EW-13 to meet future final grade.

Week of July 29, 2002
MEI completed replacement and recompaction of 12-inch clay layer over wetland material in Swale 5 on July 31.

Week of August 19, 2002
ECI mobilizes to the Site on August 21. MWH and ECI conduct a health and safety and construction kickoff meeting on August 22.

Week of August 26, 2002
ECI prepares clay surface area and site for liner installation. Liner material begins to arrive on the Site. Duneland Surveyors document existing contours of the liner area and delineate the liner extents.

Week of September 2, 2002
ECI begins the construction of the perimeter anchor trench to secure the liner on September 3. ECI begins to constructs a test pad on September 4. ECI then operates heavy equipment on it and examines the liner for any evidence of damage.

MAL mobilizes and attends a health and safety and construction kickoff meeting on September 4. MAL substantially completes installation of FML liner on September 7.

Week of September 9, 2002
MAL completes remaining detail work for liner installation, including installation of "boots" around ISVE wells and blower shed building. MAL completes quality control testing and demobilizes from the site on September 11. Duneland Surveyors survey panel and seam locations for liner installation.

ECI begins to cover the completed liner with root zone material on September 9. ECI first uses on-site material from wetland excavation. ECI then begins to import root zone material from the Merrillville source. The material is then compacted and tested for compaction and moisture content.

Week of September 16, 2002
ECI continues to cover the completed liner with root zone material. ECI has exhausted the Merrillville source and begins to import root zone material from the Griffith source. The material is then compacted and tested for compaction and moisture content.

Week of September 23, 2002
ECI finishes covering the completed liner with root zone material on September 26. The material is then compacted and tested for compaction and moisture content. ECI completes backfilling the anchor trench on September 25. ECI begins placement of topsoil material on September 26 over areas where root zone material has been installed and successfully tested.

Vapor extraction well SVE-38 is grazed by a bulldozer and damaged on September 24. MWH and ECI investigate the extent of damage.

Week of September 30, 2002
ECI completes compaction and moisture testing of the placed root zone material on October 1. ECI completes placement of topsoil material over root zone material on October 2. The Cooling Landscape Contractors place Grass seed over the site on October 3 using hydroseeding methods.

ECI completes the re-installation of the gravel access road between Colfax Avenue and the Off-Site Area Blower Shed on October 2. ECI demobilizes from the site on October 3 and 4.

Week of October 7, 2002
Duneland Surveyors complete a final topographic survey of the Site on October 8. Repair of damage to extraction well SVE-38 is completed on October 10.

Week of October 21, 2002
Area Survey resurveys the top of casing of SVE-38 on October 23.

Week of August 18, 2003

ECI on-site placing additional topsoil in the 18 areas that surveys indicated did not meet the thickness requirement.

TMK/JDP/jmf
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APPENDIX B

PHOTOGRAPHS

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

1. July 2002 (Looking South): An excavator loads PCB-impacted material from the Former On-Site Area Fire Pond into a dump truck. The dump truck has backed up to the stockpile on a geotextile mat to prevent potential tracking of material out of the work area.

2. July 2002 (Looking South): PCB-impacted material is transported from the Former Fire Pond (foreground) to the Off-Site Area (background) for placement under the final engineered cover.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

3. July 2002 (Looking Northwest): PCB-impacted material is placed in drainage Swale 5. Prior to material placement, the top 12 inches of clay was removed and stockpiled for later use.

4. July 2002 (Looking West): A smooth drum roller compacts the newly-placed PCB-impacted material.

5. July 2002 (Looking Southwest): A sheeps-foot/dozer combination machine spreads and compacts 12 inches of clay over the PCB-impacted material in two six-inch lifts.

6. July 2002 (Looking Southeast): A water truck wets the clay to aid in compaction.

7. August 2002 (Looking West): Small mounds of sand are placed around each SVE and groundwater monitoring well prior to liner installation to ensure water will not collect around the wells.

8. September 2002 (Looking North): A backhoe with a narrow-bucket is used to dig a two-foot deep anchor trench around the perimeter of the FML liner area. Air monitoring is conducted during the trenching process.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

9. September 2002 (Looking East): Construction and household debris excavated during the anchor trench construction is stockpiled on a poly liner and covered. This material is later transported to the On Site Area for placement under the On-Site Area Interim Engineered Cover.

10. September 2002 (Looking East): A low-pressure bobcat is used to place clay back into the anchor trenches around the FML perimeter. The bobcat is then used to compact the clay in the trench.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

11. September 2002 (Looking West): A test pad is constructed by covering a 23-foot by 65-foot piece of FML liner with 12-inches of root zone and six-inches of topsoil to simulate the actual construction. Heavy equipment is then run back and forth across the test pad to simulate installation methods.

12. September 2002 (Looking North): After the test pad was constructed and subjected to vehicle traffic loading, a section was uncovered and examined for evidence of damage to the FML. No damage was observed.

13. September 2002 (Looking Southwest): Trial welds are performed daily by each welding machine and operator prior to beginning and after every four hours of production work.

14. September 2002: A tensiometer is used to test the shear and peel adhesion strengths of each test piece cut from the trial welds. This machine is also used to perform destructive testing of both extrusion and fusion field welds.

15. September 2002 (Looking West): FML liner is deployed using a special attachment placed on a loader. The liner is unrolled in an east-west orientation by installation crew members. Sandbags are placed along the liner edge to prevent the liner from being picked up by the wind.

16. September 2002 (Looking North): A hole is cut in the liner as it is placed over each penetration such as an ISVE well. A "skirt" is then placed over this hole and welded to the surrounding liner and to the boot fabricated around each well.

17. September 2002 (Looking Northwest): Adjoining FML panels are overlapped four to six-inches and fusion seamed together.

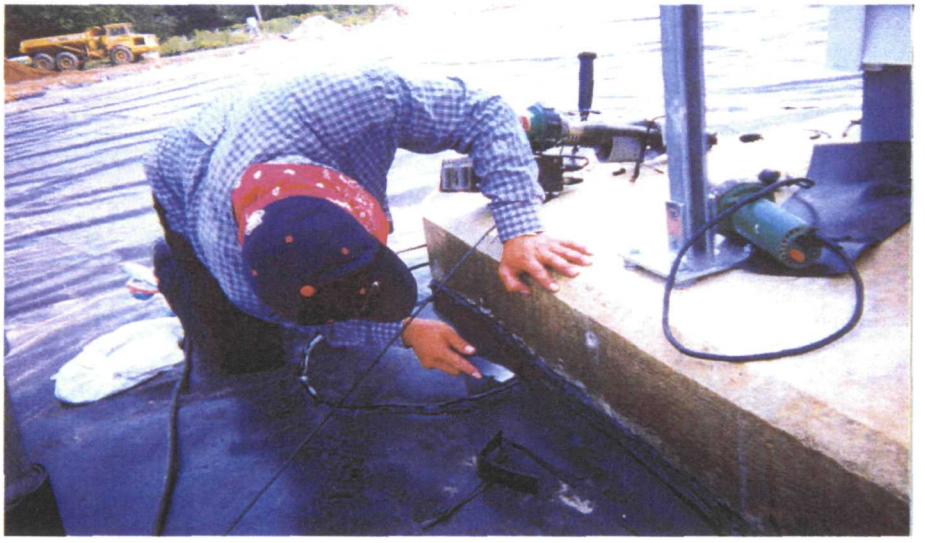
18. September 2002 (Looking North): A crew member grinds the liner surface in preparation for extrusion welding a liner "skirt" around an ISVE well. The grinder roughs the surface to give the extrusion weld a better hold.

19. September 2002 (Looking South): Surveyors document the liner extents as well as liner panel, seam, testing, and repair locations.

20. September 2002: A sample is cut from a field weld for destructive testing. The sample is tested both in the field and in the laboratory for shear and peel adhesion strength. The area where the sample is cut from is then patched and tested nondestructively.

21. September 2002: A vacuum box is used to nondestructively test extrusion welds. Soapy water is first applied to the weld. The vacuum box is then placed over the weld and is subjected to a low vacuum. If soap bubbles form along the weld, the weld contains deficiencies and needs to be repaired.

22. September 2002: A fusion weld connecting two adjoining panels is nondestructively testing using a pressure test method. The seam is sealed off at both ends and pressurized to at least 25 pounds per square inch (psi). To pass, the seam pressure must not vary by more than four psi over the five minute testing period.



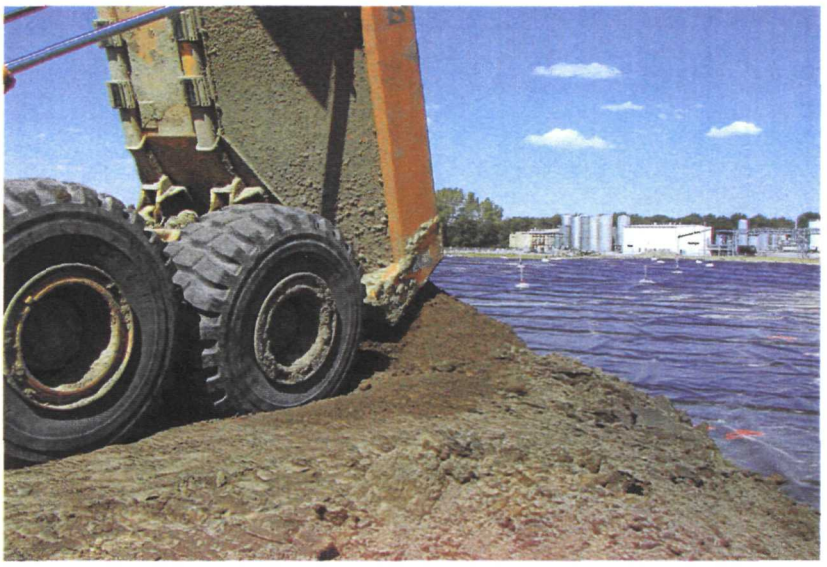
23. September 2002 (Looking East): A liner crew member applies extrusion welding around the foundation of the blower shed. The liner is welded to a continuous FML embedment strip along the blower shed foundation.

24. September 2002 (Looking South): The liner is placed in the perimeter anchor trench and later covered with clay, root zone, and topsoil.

25. September 2002 (Looking Southeast): An view of the completed FML liner.

26. September 2002 (Looking North): An excavator loads previously stockpiled wetland sand material into an off-road dump truck from the Off-Site Area stockpile for use as root zone.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site



27. September 2002 (Looking North): Wetland sand material is placed as root zone in the southern portion of the Off-Site Area.

28. September 2002 (Looking Southeast): Material is also imported from two off-site locations (one in Merrillville, one in Griffith) for use as root zone. A dozer spreads the root zone over the installed liner in one 12-inch lift.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

29. September 2002 (Looking Northwest): A temporary access road is first constructed of root zone material to allow dump trucks to enter the FML liner area to place imported root zone material.

30. September 2002: A nuclear density testing unit is used to test the moisture content and compaction at various locations across the root zone area.

31. October 2002 (Looking Northeast): Six-inches of imported topsoil is placed on top of the root zone over the entire FML Cover Area.

32. October 2002 (Looking South): A view of the completed Off-Site Area Final Engineered Cover. Topsoil and grass seed have been placed over the entire FML Cover Area. Yellow straw is visible, placed over the grass seed as erosion control.

33. October 2002 (Looking Southwest): Seaming the new boot and skirt on ISVE well, SVE-38, after the well casing has been repaired.

34. October 2002 (Looking Southwest): A vacuum box test is performed on boot and skirt on the repaired ISVE well, SVE-38.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

35. August 2003 (Looking East): Area with deficient topsoil thickness after it has been scarified.

36. August 2003 (Looking Southeast): Area with deficient topsoil thickness after additional topsoil has been placed.

Photograph Log
Off-Site Final Engineered Cover
Construction Completion Report
American Chemical Service - NPL Site

37. August 2003 (Looking Southeast): Area with previously deficient topsoil thickness after being raked and seeded.

38. August 2003 (Looking Southeast): Area with previously deficient topsoil thickness after straw is placed over the seeded topsoil.

APPENDIX C

COMPACTION AND MOISTURE TESTING RESULTS OF CLAY MATERIAL (GREAT LAKES)

Great Lakes Soil & Environmental Consultants, Inc.

333 Shore Drive, Burr Ridge, IL 60521 Ph.: (630) 321-0944 Fax: (630) 321-0945

Field Density Test Report (Nuclear Density Test)

Project:	American Chemical
Client:	MWH
File No.	2205
Date:	7-26-02
Type of Equipment Used for Compaction:	Sheeps Ft.
Specification:	95% & 17%

Test Number	Retest Ref. No.	Location of Test	Elevation/ Lift No.	Soil Description	Probe Depth (inches)	Wet Density (pcf)	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Pass Fail
1		#1	6in below	F.G. CLAY	6in	—	109.3	12.9	115.0	95.0	PASS
2		#2	"	"	"	—	109.4	18.3	"	95.1	"

Tested By: [signature]

Remarks:

Great Lakes Soil & Environmental Consultants, Inc.

333 Shore Drive, Burr Ridge, IL 60521 Ph.: (630) 321-0944 Fax: (630) 321-0945

Field Density Test Report (Nuclear Density Test)

Page 1 of 1

Project:	American Chemical
Client:	MWH
File No.	2205
Date:	7-29-02
Type of Equipment Used for Compaction:	Sheeps ft.
Specification:	95% ±1%

Test Number	Retest Ref. No.	Location of Test	Elevation/ Lift No.	Soil Description	Probe Depth (inches)	Wet Density (pcf)	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Pass Fail
1		#3	6in below	f.g. Clay	6in	—	109.4	18.0	115.0	95.1	Pass
2		#4				—	109.3	18.6		95.1	
3		#5				—	110.4	17.3		96.0	
4		#6				—	109.6	18.3		95.3	
5		#7				—	110.1	17.0		95.7	
6		#8				—	109.4	18.0		95.2	
7		#9				—	110.1	17.6		96.2	
8		#10				—	109.7	18.0		95.4	
9		#11	"	"	"	—	109.3	18.2	"	95.0	"

Tested By: [signature]

Remarks:

Great Lakes Soil & Environmental Consultants, Inc.

333 Shore Drive, Burr Ridge, IL 60521 Ph.: (630) 321-0944 Fax: (630) 321-0945

Field Density Test Report (Nuclear Density Test)

Project: American Chemical

Client: MWH

File No. 2205

Date: 7-31-02

Type of Equipment Used for Compaction: Sheeps ft. | Specification: 95.0 ± 1.7 %

Test Number	Retest Ref. No.	Location of Test	Elevation/ Lift No.	Soil Description	Probe Depth (Inches)	Wet Density (pcf)	Dry Density (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Pass Fail
1		#12	6" below F.G.	Clay	6in.	—	109.3	17.6	115.0	95.0	Pass
2		#13				—	109.4	18.0		95.1	
3		#14				—	110.1	17.5		95.7	
4		#15				—	109.5	17.2		95.2	
5		#16				—	110.0	18.5		95.6	
6		#17				—	109.9	18.0		95.5	
7		#18	F.G			—	109.6	17.0		95.3	
8		#19				—	109.9	18.7		95.5	
9		#20				—	109.3	18.0		95.0	
10		#21				—	109.2	17.6		95.0	
11		#22				—	109.3	18.0		95.0	
12		#23				—	110.6	17.4		96.1	
13		#24				—	109.6	19.9		95.3	
14		#25				—	109.2	17.0		95.0	
15		#26				—	113.0	17.1		98.2	
16		#27				—	109.3	18.1		95.0	
17		#28				—	111.4	17.6		96.8	
18		#30				—	112.1	17.4		97.4	
19		#31				—	110.7	18.0		96.2	
20		#32				—	109.4	19.2		95.1	
21		#33				—	109.5	17.0		95.2	

Tested By:

Remarks:

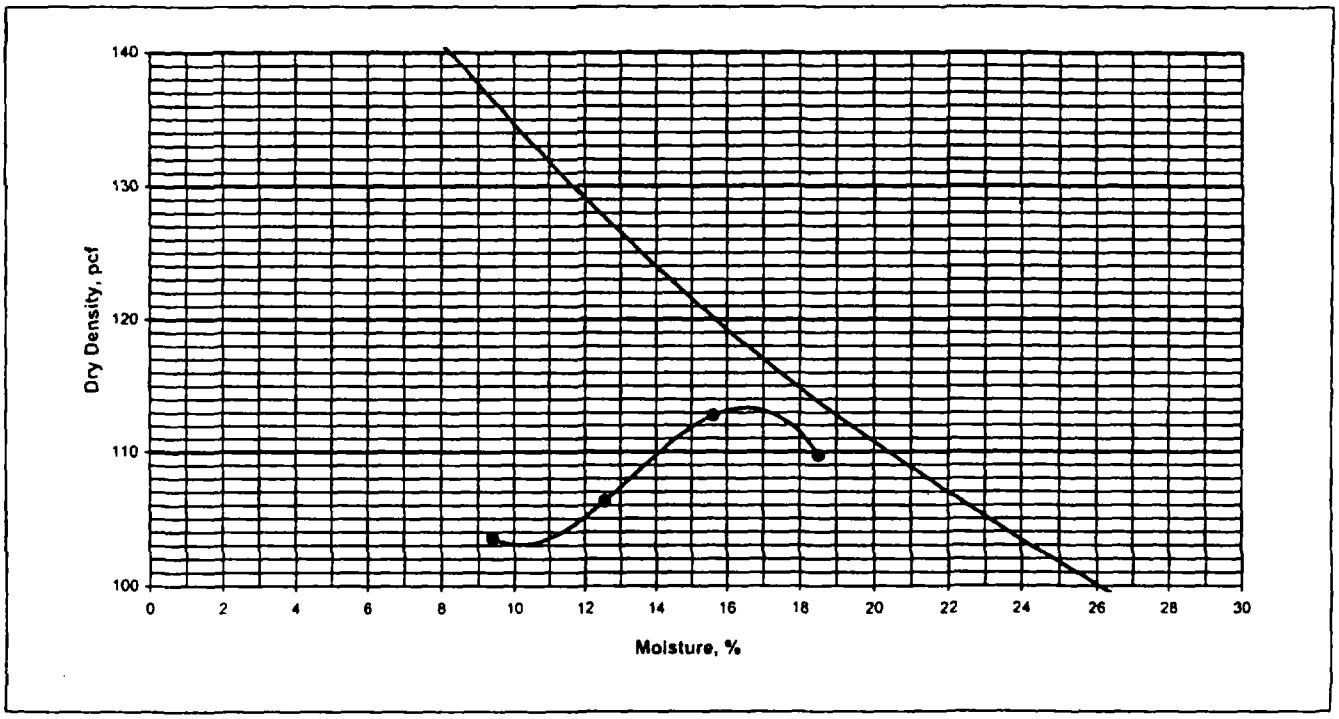
Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

MOISTURE - DENSITY RELATIONSHIP CURVE

ASTM D698-91

Project	ACS Superfund Site-Field and Laboratory Testing Services						
Client	Koester Environmental Services 14649 Highway 41 North, Evansville, IN 47725 Attn.: Mr. Jeff Wickham						
File No.	2205	**Sample #**	BS-1	**Date Tested**	7/24/2001	**Tested By**	SR
						Qc By	SB

Sample Location									
Sample Description	Brown silty clay								
Type of Proctor	Standard	**Method:**	A	**Mold Size, in.**	4	**Hammer Weight, lb.**	5.5	**Drop, in.**	12
No. of Layers	3	**No. of Blows per Layer**			25				



Zero Air Void Curve Specific Gravity: 2.75

Results

Maximum Dry Density, pcf	113.5	**Optimum Moisture Content, %**	16.5	**Natural Moisture Content, %**	9.5

Remarks

APPENDIX D

COMPACTION AND MOISTURE TESTING RESULTS FOR TEST PAD (K&S)

SEP 18 2002

K & S Engineers, Inc.

9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-4-02 REPORT NO. 2 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION	
STONE		MOIST		VIBRATING PLATE	
SAND	X	DAMP	X	VIBRATING ROLLER	X
CLAY		WET		SHEEPS FOOT ROLLER	
SLAG		DRY		RUBBER TIRE ROLLER	
		FROZEN			
		SOFT			
		LOOSE			
		FIRM	X		

LABORATORY DATA AND PROCEDURES		FIELD TEST METHOD	
ASTM D 1557 - 91	METHOD	ASTM D 1556 - 90	
ASTM D 698 - 91 X	METHOD A	ASTM D 3017 - 93	X
PROJECT SPECIFICATIONS		OTHER	
REFERENCE TEST No.: 1		SPECIFICATON REQUIREMENTS	
MAXIMUM DENSITY PCF 109.0		% MAXIMUM DENSITY	
OPTIMUM MOISTURE% 11.0		% RELATIVE DENSITY	

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPAC-TION %	PASS OR FAIL	LOCATION OF TEST
							TEST PAD
9-4	1	1	105.8	7.2	97.2		15' N & 4' E OF SOUTH WEST CORNER
9-4	1	2	109.6	9.4	100+		5' N & 15' E OF SOUTH WEST CORNER
9-4	1	3	105.8	9.1	97.0		30' N & 16' E OF SOUTH WEST CORNER
9-4	1	4	106.3	7.4	97.5		25' N & 18' E OF SOUTH WEST CORNER

c: Client

SEP 18 200?

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-4-02 REPORT NO. 1 SHEET 1 OF 1

TYPE OF FILL	COMPACTION OF GRADE		METHOD OF COMPACTION
STONE	MOIST	FROZEN	VIBRATING PLATE
SAND	DAMP X	SOFT	VIBRATING ROLLER X
CLAY (TOPSOIL) X	WET	LOOSE	SHEEPS FOOT ROLLER
SLAG	DRY	FIRM X	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES	FIELD TEST METHOD
ASTM D 1557 - 91 METHOD	ASTM D 1556 - 90
ASTM D 698 - 91 X METHOD A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS	OTHER
REFERENCE TEST No.: 4	SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF 97.0	% MAXIMUM DENSITY
OPTIMUM MOISTURE% 21.5	% RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
							TEST PAD
9-4	4 (MWH, June 2004)	1	91.4	17.1	94.2		10' N & 5' E OF SOUTH WEST CORNER
9-4	4 (MWH, June 2004)	2	94.3	13.6	97.2		20' N & 10' E OF SOUTH WEST CORNER
9-4	4 (MWH, June 2004)	3	86.6	11.6	89.2		30' N & 18' E OF SOUTH WEST CORNER

c: Client

APPENDIX E

FACTORY TEST RECORDS FOR FML MATERIAL (POLY-FLEX)

- **Poly-Flex Warranty Letter**
- **Poly-Flex Certification Documents**

- **Poly-Flex Warranty Letter**

SEP 16 2002

POLY-FLEX, INC.

2000 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

10 September, 2002

Steve Palmer
Environmental Contractors of IL
5290 Nimtz Rd
Loves Park, IL 61111

Dear Steve,

Re: American Chemical Service Inc. Site

Poly-Flex, Inc. LLDPE textured and smooth liners are suitable for exposed applications and are warranted for up to 20 years in exposed applications.

Please let me know if you need any additional information.

Best regards,

Anne Steacy
Regional Sales Manager
Poly-Flex, Inc.

Cc: Jennifer Battle/Mid America Lining

- **Poly-Flex Certification Documents**

POLY-FLEX, INC. 2000 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Environmental Contractors of Illinois
P.O. Box 2071
Loves Park, IL61130

Attn: Daryl Streed
Fax No: 815-636-4304
Number of pages including cover: 4

Date: 8/28/02
Poly-Flex Proj # : 220677
Customer PO: 15506
Project Name: ECI

Departure Date: 8/27/02
Destination: Griffith, IN
Carrier:

Trip No: 149508

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet:	1
Roll Certification:	1
Resin Certification:	1
Other:	

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcey

Russell Searcey
1-888-765-9359 ext 7269

CERTIFICATION SHEET

DATE: August 28, 2002

PROJECT NO: 220677

ORDER NO: 483654

TRIP NO: 149508

CERTIFIED BY:

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

TEST DESCRIPTION		THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY
ASTM METHOD		D5199	D1603	D1004	4833	D638	D638	D3015	D1505
(modifications)		min/avg							
UNITS		mils	%	lb	lb	ppi	%		gm/cc
SPECIFICATION		54/60	2.0-3.0	33	84	228	560	A1,A2,B1	0.939
ROLL NUMBER	BLEND								
P9-6-02 28-5	8120674	54/ 62	2.7	46	118	276	885	A-2	0.937
P9-6-02 30-5	8120674	54/ 62	2.7	47	122	293	898	A-2	0.937
P9-6-02 34-5	8120674	54/ 62	2.7	44	124	283	913	A-2	0.937
P9-6-02 35-5	8120674	54/ 62	2.7	44	124	283	913	A-2	0.937
P9-6-02 41-5	8120674	54/ 61	2.9	43	116	281	942	A-1	0.937
P9-6-02 42-5	8120674	54/ 61	2.3	44	122	272	828	A-1	0.937
P9-6-02 45-5	8120674	54/ 61	2.3	42	123	278	940	A-1	0.937
P9-6-02 46-5	8120674	54/ 61	2.3	42	123	278	940	A-1	0.937
P9-6-02 47-5	8120674	54/ 61	2.3	42	123	278	940	A-1	0.937
P9-6-02 48-5	8120674	54/ 61	2.3	46	120	283	854	A-2	0.937
P9-6-02 49-5	8120674	54/ 62	2.3	46	120	283	854	A-2	0.937
P9-6-02 50-5	8120674	54/ 62	2.3	46	120	283	854	A-2	0.937

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 27-Aug-02 TRIP 149508

Drop #	1	Drop #	1	Drop #		Drop #	
Poly-Flex #	220677(483654)	Poly-Flex #	220677(484126)	Poly-Flex #		Poly-Flex #	
Customer:	ENVRO CONT.	Customer:	ENVRO CONT.	Customer:		Customer:	
Destination:	GRIFFITH, IN	Destination:	GRIFFITH, IN	Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8120674	P9-6-02- 0034- 6	3,509	23' X 500' X .060LL
2	8120674	P9-6-02- 0030- 6	3,507	23' X 500' X .060LL
3	8120674	P9-6-02- 0047- 6	3,494	23' X 500' X .060LL
4	8120674	P9-6-02- 0042- 6	3,491	23' X 500' X .060LL
5	8120674	P9-6-02- 0041- 6	3,471	23' X 500' X .060LL
6	8120674	P9-6-02- 0048- 6	3,475	23' X 500' X .060LL
7	8120674	P9-6-02- 0050- 6	3,501	23' X 500' X .060LL
8	8120674	P9-6-02- 0028- 6	3,515	23' X 500' X .060LL
9	8120674	P9-6-02- 0035- 6	3,515	23' X 500' X .060LL
10	8120674	P9-6-02- 0045- 6	3,491	23' X 500' X .060LL
11	8120674	P9-6-02- 0049- 6	3,495	23' X 500' X .060LL
12	8120674	P9-6-02- 0046- 6	3,473	23' X 500' X .060LL
13		P56-05-(719- 724)- 5	180	5MM GEI - WELDONG ROD - LL
14				
15				
16				
17				
18				
19			**42,117**	
20				
21				
22				
23				
24				
25				
26				
27				
28				

I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

June 10, 2002

PSN# 13415-02

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K203
Lot Number:	8120674
P.O. Number:	60039
Date Shipped:	06/10/02
Package:	CHVX898197
Quantity:	178000 LBS.
Melt Index, ASTM D1238:	.210 G/10 MIN
Density, ASTM D1505:	.923 G/CC
HLMI Flow Rate, ASTM D1238:	16.8 G/10 MIN
Production Date:	05/11/02

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

SEP 04 2002

POLY-FLEX, INC.

2000 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Environmental Contractors of Illinois
P.O. Box 2071
Loves Park, IL61130

Attn: Daryl Streed
Fax No: 815-636-4304
Number of pages including cover: 4

Date: 8/29/02
Poly-Flex Proj # : 220677
Customer PO: 15506
Project Name: ECI

Departure Date: 8/28/02
Destination: Griffith, IN
Carrier:

Trip No: 149509

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet:	1
Roll Certification:	1
Resin Certification:	1
Other:	

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcey

Russell Searcey
1-888-765-9359 ext 7269

CERTIFICATION SHEET

DATE: August 28, 2002

PROJECT NO: 220677

ORDER NO: 483657

TRIP NO: 149509

CERTIFIED BY:

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

TEST DESCRIPTION			THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY
ASTM METHOD			D5199	D1603	D1004	4833	D638	D638	D3015	D1505
(modifications)			min/avg							
UNITS			mils	%	lb	lb	ppi	%		gm/cc
SPECIFICATION			54/60	2.0-3.0	33	84	228	560	A1,A2,B1	0.939
ROLL NUMBER		BLEND								
P9-6-02	16-5	8120674	54/ 61	2.4	43	119	286	940	A 1	0.936
P9-6-02	20-5	8120674	54/ 61	2.3	44	117	294	907	A 1	0.936
P9-6-02	21-5	8120674	54/ 61	2.6	44	121	286	913	A 1	0.936
P9-6-02	24-5	8120674	59/ 62	2.6	50	122	307	876	A 1	0.936
P9-6-02	25-5	8120674	55/ 63	2.6	50	122	307	876	A 1	0.936
P9-6-02	26-5	8120674	54/ 62	2.6	50	122	307	876	A 1	0.936
P9-6-02	27-5	8120674	54/ 62	2.7	46	118	276	885	A 2	0.937
P9-6-02	29-5	8120674	54/ 62	2.7	46	118	276	885	A 2	0.937
P9-6-02	31-5	8120674	54/ 62	2.7	47	122	293	898	A 2	0.937
P9-6-02	32-5	8120674	54/ 62	2.7	47	122	293	898	A 2	0.937
P9-6-02	43-5	8120674	54/ 61	2.3	44	122	272	828	A 1	0.937
P9-6-02	44-5	8120674	55/ 61	2.3	44	122	272	828	A 1	0.937

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 28-Aug-02 TRIP 149509

Drop #	1	Drop #		Drop #		Drop #	
Poly-Flex #	220677(483657)	Poly-Flex #		Poly-Flex #		Poly-Flex #	
Customer:	ENVIRO. CONT.	Customer:		Customer:		Customer:	
Destination:	GRIFFITH, IN	Destination:		Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8120674	P9-6-02- 0016- 5	3,473	23' X 500' X .060LL
2	8120674	P9-6-02- 0020- 5	3,480	23' X 500' X .060LL
3	8120674	P9-6-02- 0021- 5	3,489	23' X 500' X .060LL
4	8120674	P9-6-02- 0024- 5	3,515	23' X 500' X .060LL
5	8120674	P9-6-02- 0025- 5	3,585	23' X 500' X .060LL
6	8120674	P9-6-02- 0026- 5	3,519	23' X 500' X .060LL
7	8120674	P9-6-02- 0027- 5	3,513	23' X 500' X .060LL
8	8120674	P9-6-02- 0029- 5	3,511	23' X 500' X .060LL
9	8120674	P9-6-02- 0031- 5	3,503	23' X 500' X .060LL
10	8120674	P9-6-02- 0032- 5	3,505	23' X 500' X .060LL
11	8120674	P9-6-02- 0043- 5	3,483	23' X 500' X .060LL
12	8120674	P9-6-02- 0044- 5	3,477	23' X 500' X .060LL
13				
14				
15				
16				
17				
18				
19			**42,053**	
20				
21				
22				
23				
24				
25				
26				
27				
28				

I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

June 10, 2002

PSN# 13415-02

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K203
Lot Number:	8120674
P.O. Number:	60039
Date Shipped:	06/10/02
Package:	CHVX898197
Quantity:	178000 LBS.
Melt Index, ASTM D1238:	.210 G/10 MIN
Density, ASTM D1505:	.923 G/CC
HLMI Flow Rate,ASTM D1238:	16.8 G/10 MIN
Production Date:	05/11/02

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

SEP 04 2002

POLY-FLEX, INC.

2000 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Environmental Contractors of Illinois
P.O. Box 2071
Loves Park, IL61130

Attn: Daryl Streed
Fax No: 815-636-4304
Number of pages including cover: 4

Date: 8/30/02
Poly-Flex Proj # : 220677
Customer PO: 15506
Project Name: ECI

Departure Date: 8/29/02
Destination: Griffith, IN
Carrier:

Trip No: 149661

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet:	1
Roll Certification:	1
Resin Certification:	1
Other:	

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcey

Russell Searcey
1-888-765-9359 ext 7269

CERTIFICATION SHEET

DATE: August 30, 2002

PROJECT NO: 220677

ORDER NO: 483658

TRIP NO: 149661

CERTIFIED BY: [signature]

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

TEST DESCRIPTION		THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY
ASTM METHOD		D5199	D1603	D1004	4833	D638	D638	D3015	D1505
(modifications)		min/avg							
UNITS		mils	%	lb	lb	ppi	%		gm/cc
SPECIFICATION		54/60	2.0-3.0	33	84	228	560	A1,A2,B1	0.939
ROLL NUMBER	BLEND								
P9-6-02 5-5	8120674	54/ 61	2.1	49	112	275	872	A-1	0.935
P9-6-02 6-5	8120674	54/ 61	2.9	47	124	272	850	A-1	0.937
P9-6-02 7-5	8120674	54/ 63	2.9	47	124	272	850	A-1	0.937
P9-6-02 36-5	8120674	54/ 62	2.7	46	121	285	872	A-1	0.937

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

June 10, 2002

PSN# 13415-02

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	K203
Lot Number:	8120674
P.O. Number:	60039
Date Shipped:	06/10/02
Package:	CHVX898197
Quantity:	178000 LBS.
Melt Index, ASTM D1238:	.210 G/10 MIN
Density, ASTM D1505:	.923 G/CC
HLMI Flow Rate, ASTM D1238:	16.8 G/10 MIN
Production Date:	05/11/02

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 29-Aug-02 TRIP 149661

Drop #	1	Drop #	2	Drop #		Drop #	
Poly-Flex #	220677(483658)	Poly-Flex #	225132(474976)	Poly-Flex #		Poly-Flex #	
Customer:	ENVIRO CONTR.	Customer:	C & C	Customer:		Customer:	
Destination:	GRIFFITH, IN	Destination:	MARSHALL, MI	Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8120674	P9-6-02- 0005- 5	3,453	23' X 500' X .060LL
2	8120674	P9-6-02- 0006- 5	3,481	23' X 500' X .060LL
3	8120674	P9-6-02- 0007- 5	3,601	23' X 500' X .060LL
4	8120674	P9-6-02- 0036- 5	3,461	23' X 500' X .060LL
5				
6	8101439	PR-6-01- 0122- X	3,628	23' X 375' X .060LLT
7	8101439	PR-6-01- 0123- X	3,558	23' X 375' X .060LLT
8	8101439	PR-6-01- 0124- X	3,548	23' X 375' X .060LLT
9	8101439	PR-6-01- 0125- X	3,660	23' X 375' X .060LLT
10	8101439	PR-6-01- 0126- X	3,664	23' X 375' X .060LLT
11	8101439	PR-6-01- 0127- X	3,698	23' X 375' X .060LLT
12	8101439	PR-6-01- 0128- X	3,698	23' X 375' X .060LLT
13	8101439	PR-6-01- 0129- X	3,696	23' X 375' X .060LLT
14				
15				
16				
17				
18				
19			**43,146**	
20				
21				
22				
23				
24				
25				
26				
27				
28				

I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

APPENDIX F

FIELD TEST RECORDS FOR FML INSTALLATION (MID-AMERICA LINING)

- **Certificates of Acceptance of Soil Subgrade Surface**
- **Panel Placement Log**
- **Panel Seaming Form**
- **Non-Destructive Test Log**
- **Field Destructive Test Log**
- **Laboratory Destructive Test Results**
- **Repair Log**
- **Trial Weld Log**
- **Quality Control (QC) Daily Field Report**
- **Certificate of Acceptance for Installed FML**

- **Certificates of Acceptance of Soil Subgrade Surface**

MID - AMERICA LINING CO.

Certificate of Acceptance of Soil Subgrade Surface

Date: 9 / 05 / 02

Project Name: American Chemical Services

Project Location: Griffin, IN

Owners Representative: E.C.I.

I, the understand, a duly appointed repersentative of Mid - America Lining Company (MAL), have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

This certification is based on observations of the surface of subgrade only. No subterranean inspections or tests have been performed by MAL, and MAL makes no representations or warranties regarding conditions which must exist below the surface of the subgrade. MAL accepts no responsibility for the conformance of the subgrade to this project's spefications.

Area Being Accepted : Panels 1 - 18

Mid - America Lining Company Representative:

Date : 9 / 05 / 02

Print Name : Robertson, Eric, D.

Signature :

Title: Field QC

Owners/Owners Representative:

Date : 9-6-02

Print Name : Steve Palmer

Signature :

Title: Site Supervisor

MID - AMERICA LINING CO.

Certificate of Acceptance of Soil Subgrade Surface

Date: 9 / 06 / 02

Project Name: American Chemical Services

Project Location: Griffin, IN

Owners Representative: E.C.I.

I, the understand, a duly appointed repersentative of Mid - America Lining Company (MAL), have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

This certification is based on observations of the surface of subgrade only. No subterranean inspections or tests have been performed by MAL, and MAL makes no representations or warranties regarding conditions which must exist below the surface of the subgrade. MAL accepts no responsibility for the conformance of the subgrade to this project's spefications.

Area Being Accepted : Panels 19 - 37

Mid - America Lining Company Representative:

Date : 9 / 06 / 02

Print Name : Robertson, Eric, D.

Signature : E. D. Robertson

Title: Field QC

Owners/Owners Representative:

Date : 9 / 06 / 02

Print Name : Palmer, Steve

Signature : Steve Palmer

Title: Site Supervisor

MID - AMERICA LINING CO.

Certificate of Acceptance of Soil Subgrade Surface

Date: 9 / 07 / 02

Project Name: American Chemical Services

Project Location: Griffin, IN

Owners Representative: E.C.I.

I, the understand, a duly appointed repersentative of Mid - America Lining Company (MAL), have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

This certification is based on observations of the surface of subgrade only. No subterranean inspections or tests have been performed by MAL, and MAL makes no representations or warranties regarding conditions which must exist below the surface of the subgrade. MAL accepts no responsibility for the conformance of the subgrade to this project's spefications.

Area Being Accepted : Panels 38 - 61

Mid - America Lining Company Representative:

Date : 9 / 07 / 02

Print Name : Robertson, Eric, D.

Signature :

Title: Field QC

Owners/Owners Representative:

Date : 9 / 07 / 02

Print Name : Palmer, Steve

Signature :

Title: Site Supervisor

- **Panel Placement Log**

MID - AMERICA LINING CO.

Page: 1 of: _____

Panel Placement Log

Project Name: American Chemical Services

Date: 9 / 5 / 02

Project Location: Griffin, IN

Material Description: 60 Mil L.L.D.P.E.

Panel Number	Roll Number	Panel Length	Panel Width	Square Footage	Comments
1	**0043**	328	22.5	**7380**	
2	**0043**	112	22.5	**2520**	
3	**0049**	240	22.5	**5400**	
4	**0049**	240	22.5	**5400**	
5	**0050**	136	22.5	**3060**	
6	**0050**	346	22.5	**7785**	
7	**0045**	34	22.5	**765**	
8	**0045**	386	22.5	**8685**	
9	**0045**	50	22.5	**1125**	
10	**0048**	340	22.5	**7650**	
11	**0048**	144	22.5	**3240**	
12	**0041**	246	22.5	**5535**	
13	**0041**	238	22.5	**5355**	
14	**0047**	234	22.5	**5265**	
15	**0047**	332	22.5	**7470**	
16	**0034**	68	22.5	**1530**	
17	**0034**	408	22.5	**9180**	
18	**0030**	414	22.5	**9315**	

12/00 - E.D.R.

Daily Square Footage	**96,660**
Square Footage to Date	**96,660**

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

Panel Placement Log

Project Name: American Chemical Services Date: 9 / 6 / 02

Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

Panel Number	Roll Number	Panel Length	Panel Width	Square Footage	Comments
19	0030	68	22.5	1530	
20	0035	364	22.5	8190	
21	0035	128	22.5	2880	
22	0042	306	22.5	6885	
23	0042	182	22.5	4095	
24	0046	250	22.5	5625	
25	0046	220	22.5	4950	
26	0005	172	22.5	3870	
27	0005	240	22.5	5400	
28	0036	182	22.5	4095	
29	0036	306	22.5	6885	
30	0006	112	22.5	2520	
31	0006	374	22.5	8415	
32	0028	40	22.5	900	
33	0028	412	22.5	9270	
34	0028	28	22.5	630	
35	0007	376	22.5	8460	
36	0007	106	22.5	2385	
37	0025	296	22.5	6660	

12/00 - E.D.R.

Daily Square Footage	93,645
Square Footage to Date	190,305

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

Panel Placement Log

Project Name: American Chemical Services Date: 9/7/02

Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

Panel Number	Roll Number	Panel Length	Panel Width	Square Footage	Comments
38	0025	154	22.5	3465	
39	0026	244	22.5	5490	
40	0026	244	22.5	5490	
41	0027	156	22.5	3510	
42	0027	322	22.5	7245	
43	0024	-82	22.5	-1845	
44	0024	84	22.5	1890	
45	0032	26	22.5	585	
46	0032	406	22.5	9135	
47	0032	44	22.5	990	
48	0016	354	22.5	7965	
49	0016	136	22.5	3060	
50	0020	252	22.5	5670	
51	0020	226	22.5	5085	
52	0029	144	22.5	3240	
53	0029	310	22.5	6975	
54	0031	14	22.5	315	
55	0031	258	22.5	5805	
56	0031	162	22.5	3645	

12/00 - E.D.R

Daily Square Footage: Cont.

Square Footage to Date: Cont.

Q.C. Initials: E.D.R

MID-AMERICA LINING CO.

Panel Placement Log

Project Name: American Chemical Services Date: 9/7/02

Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

Panel Number	Roll Number	Panel Length	Panel Width	Square Footage	Comments
57	0044	34	22.5	765	
58	0044	146	22.5	3285	
59	0044	92	22.5	2070	
60	0044	60	22.5	1350	
61	0021	42	22	462	

12/00 - E.D.R.

Daily Square Footage	85,647
Square Footage to Date	275,952

Q.C. Initials: E.D.R.

- **Panel Seaming Form**

MID - AMERICA LINING CO.

PANEL SEAMING FORM

Page: 1 **of:** _____

Project Name: American Chemical Services Project Location: Griffin, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9/05 08.45h	1 / 2	104	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 09.18h	1 / 3	232	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 09.05h	2 / 3	22.5	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 09.49h	2 / 4	122	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 09.55h	3 / 4	118	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 10.10h	3 / 5	132	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 09.32h	4 / 5	22.5	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 10.10h	4 / 6	242	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 10.38h	5 / 6	110	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 10.50h	5 / 7	30	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 10.03h	6 / 7	22.5	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 10.36h	6 / 8	344	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 11.17h	7 / 8	40	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 12.57h	8 / 10	342	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 13.36h	8 / 9	46	MS	C - 1	750	Sunny	5 - 15	75	P	

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

PANEL SEAMING FORM

Project Name: American Chemical Services Project Location: Griffin, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9/05 13.00h	9 / 10	22.5	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 13.22h	10 / 11	146	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 13.42h	10 / 12	190	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 14.05	9 / 12	54	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 13.14h	11 / 12	22.5	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 13.55h	11 / 13	144	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 14.13h	12 / 13	96	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 14.23h	12 / 14	154	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 13.50h	13 / 14	22.5	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 14.26h	13 / 15	238	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 15.00h	14 / 15	98	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 15.10h	14 / 16	64	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 14.17h	15 / 16	22.5	MSO	C - 4	750	Sunny	5 - 15	75	P	
9/05 14.48h	15 / 17	330	MS	C - 1	750	Sunny	5 - 15	75	P	
9/05 15.30h	16 / 17	74	MS	C - 1	750	Sunny	5 - 15	75	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

PANEL SEAMING FORM

Project Name: American Chemical Services Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9 / 05 14.17h	15 / 16	22.5	MSO	C - 4	750	Sunny	5 - 15	75	P	
9 / 05 15.30h	17 / 18	414	MSO	C - 4	750	Sunny	5 - 15	75	P	
9 / 06 08.00h	18 / 19	66	MS	C - 1	750	Sunny	5 - 15	85	P	
9 / 06 08.10h	18 / 20	362	MS	C - 1	750	Sunny	5 - 15	85	P	
9 / 06 08.07h	19 / 20	22.5	MSO	C - 4	750	Sunny	5 - 15	85	P	
9 / 06 08.48h	19 / 21	70	MSO	C - 4	750	Sunny	5 - 15	85	P	
9 / 06 09.00h	20 / 21	58	MSO	C - 4	750	Sunny	5 - 15	85	P	
9 / 06 09.06h	20 / 22	308	MSO	C - 4	750	Sunny	5 - 15	85	P	
9 / 06 09.58h	22 / 23	54	MS	C - 1	750	Sunny	5 - 15	85	P	
9 / 06 10.06h	22 / 24	252	MS	C - 1	750	Sunny	5 - 15	85	P	
9 / 06 09.45h	21 / 23	130	MS	C - 1	750	Sunny	5 - 15	85	P	
9 / 06 08.39h	21 / 22	22.5	MSO	C - 4	750	Sunny	5 - 15	85	P	
9 / 06 09.36h	23 / 24	22.5	MS	C - 1	750	Sunny	5 - 15	85	P	
9 / 06 10.00h	23 / 25	182	MSO	C - 4	750	Sunny	5 - 15	85	P	
9 / 06 10.21h	24 / 25	20	MS	C - 1	750	Sunny	5 - 15	85	P	

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

PANEL SEAMING FORM

Page: 4 **of:** _____

Project Name: American Chemical Services Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9 / 06 10.36h	**24 / 26**	196	**MSO**	**C - 4**	750	*Sunny*	5 - 15	75	P	
9 / 06 12.55h	**26 / 28**	170	**MS**	**C - 1**	750	*Sunny*	5 - 15	75	P	
9 / 06 10.46h	**25 / 27**	224	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	
9 / 06 12.50h	**27 / 28**	20	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.06h	**27 / 30**	110	**MSO**	**C - 4**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.19h	**27 / 29**	130	**MSO**	**C - 4**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.37h	**28 / 29**	180	**MSO**	**C - 4**	750	*Sunny*	5 - 15	85	P	
9 / 06 12.54h	**29 / 30**	22.5	**MSO**	**C - 4**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.28h	**30 / 31**	116	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.38h	**29 / 31**	268	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	
9 / 06 14.05h	**29 / 32**	46	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.26h	**31 / 32**	22.5	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	
9 / 06 14.15h	**31 / 33**	376	**MSO**	**C - 4**	750	*Sunny*	5 - 15	85	P	
9 / 06 15.12h	**32 / 33**	40	**MSO**	**C - 4**	750	*Sunny*	5 - 15	85	P	
9 / 06 13.26h	**31 / 32**	22.5	**MS**	**C - 1**	750	*Sunny*	5 - 15	85	P	

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

PANEL SEAMING FORM

Project Name: American Chemical Services Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9 / 06 14.34h	33 / 34	32	MS	C - 1	750	*Sunny*	5 - 15	75	P	
9 / 06 14.40h	33 / 35	376	MS	C - 1	750	*Sunny*	5 - 15	75	P	
9 / 06 14.25h	34 / 35	22.5	MS	C - 1	750	*Sunny*	5 - 15	85	P	
9 / 06 15.30h	34 / 37	26	MS	C - 1	750	*Sunny*	5 - 15	85	P	
9 / 06 15.35h	35 / 37	270	MS	C - 1	750	*Sunny*	5 - 15	85	P	
9 / 06 16.16h	35 / 36	106	MS	C - 1	750	*Sunny*	5 - 15	85	P	
9 / 06 16.13h	36 / 37	22.5	MS	C - 1	750	*Sunny*	5 - 15	85	P	
9 / 07 08.25h	36 / 39	114	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 08.10h	37 / 39	128	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 07.52h	37 / 38	162	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 08.11h	38 / 39	22.5	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 08.18h	38 / 40	154	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 08.40h	39 / 40	96	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 08.53h	39 / 41	150	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 08.50h	40 / 41	22.5	MS	C - 1	750	*Sunny*	5 - 15	90	P	

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

PANEL SEAMING FORM

Project Name: American Chemical Services Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9 / 07 08.50h	40 / 41	22.5	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 09.10h	40 / 43	88	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 09.23h	40 / 42	152	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 09.42h	41 / 42	162	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 09.05h	42 / 43	22.5	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 10.12h	43 / 44	82	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 10.22h	42 / 44	308	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 10.50h	42 / 45	22	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 11.02h	44 / 45	22.5	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 10.09h	44 / 46	378	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 10.55h	45 / 46	30	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 13.17h	46 / 47	50	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 13.28h	46 / 48	354	MSO	C - 4	750	*Sunny*	5 - 15	90	P	
9 / 07 13.06h	47 / 48	22.5	MS	C - 1	750	*Sunny*	5 - 15	90	P	
9 / 07 13.18h	47 / 50	40	MS	C - 1	750	*Sunny*	5 - 15	90	P	

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

PANEL SEAMING FORM

Project Name: American Chemical Services Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9 / 07 13.18h	48 / 50	218	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 13.45h	48 / 49	136	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 13.03h	49 / 50	22.5	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 14.13h	50 / 51	232	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 14.45h	50 / 52	16	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 14.47h	49 / 52	136	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 14.08h	51 / 52	22.5	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 14.35h	51 / 54	22	MSO	C - 4	750	Sunny	5 - 15	90	P	
9 / 07 14.38h	51 / 53	198	MSO	C - 4	750	Sunny	5 - 15	90	P	
9 / 07 15.04h	52 / 53	138	MSO	C - 4	750	Sunny	5 - 15	90	P	
9 / 07 14.25h	53 / 54	22.5	MSO	C - 4	750	Sunny	5 - 15	90	P	
9 / 07 15.10h	53 / 55	286	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 15.08h	54 / 55	6	MS	C - 1	750	Sunny	5 - 15	90	P	
9 / 07 15.34h	55 / 56	168	MSO	C - 4	750	Sunny	5 - 15	90	P	
9 / 07 16.00h	55 / 57	56	MSO	C - 4	750	Sunny	5 - 15	90	P	

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

PANEL SEAMING FORM

Project Name: American Chemical Services Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E.

Date / Time	Seam Number	Seam Length	Seamer Initials	Machine Number	Temp. Setting	Weather	Winds	Ambient Temp.	DS Test P/F	Comments
9 / 07 15.55h	**56 / 57**	22.5	**MSO**	**C - 4**	750	*Sunny*	5 - 15	90	P	
9 / 07 15.48h	**56 / 58**	158	**MS**	**C - 1**	750	*Sunny*	5 - 15	90	P	
9 / 07 16.06h	**57 / 58**	14	**MS**	**C - 1**	750	*Sunny*	5 - 15	90	P	
9 / 07 16.17h	**58 / 59**	126	**MSO**	**C - 4**	750	*Sunny*	5 - 15	90	P	
9 / 07 16.16h	**59 / 60**	80	**MS**	**C - 1**	750	*Sunny*	5 - 15	90	P	
9 / 07 16.35h	**60 / 61**	42	**MSO**	**C - 4**	750	*Sunny*	5 - 15	90	P	
				END						

12/00 - E.D.R.

Q.C. Initials: E.D.R.

- **Non-Destructive Test Log**

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 05	1 / 2	ER	31	31	0	09.47	09.52	P	
9 / 05	1 / 3	ER	31	31	0	09.47	09.52	P	
9 / 05	1 / 3	ER	31 (MWH, June 2004)	28	-3	09.54	09.59	P	
9 / 05	2 / 3	ER	30	28	-2	09.47	09.52	P	
9 / 05	2 / 4	ER	31	30	-1	10.05	10.10	P	
9 / 05	3 / 4	ER	31	29	-2	10.05	10.10	P	
9 / 05	3 / 4	ER	31	30	-1	10.29	10.34	P	
9 / 05	3 / 5	ER	31	29	-2	10.29	10.34	P	
9 / 05	4 / 6	ER	31	31	0	10.56	11.01	P	
9 / 05	4 / 6	ER	31	29	-2	10.56	11.01	P	
9 / 05	5 / 6	ER	31	30	-1	11.03	11.08	P	
9 / 05	5 / 7	ER	31	29	-2	11.03	11.08	P	
9 / 05	6 / 7	ER	31	30	-1	10.19	10.24	P	
9 / 05	6 / 8	ER	31	28	-3	12.37	12.42	P	
9 / 05	7 / 8	ER	31	28	-3	12.37	12.42	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 05	8 / 10	ER	31	29	-2	13.50	13.55	P	
9 / 05	8 / 9	ER	31	31	0	13.50	13.55	P	
9 / 05	9 / 10	ER	31	29	-2	13.50	13.55	P	
9 / 05	10 / 11	ER	31	28	-3	14.15	14.20	P	
9 / 05	10 / 12	ER	31	31	0	14.15	14.20	P	
9 / 05	9 / 12	ER	31	29	-2	14.22	14.27	P	
9 / 05	11 / 12	ER	31	31	0	14.15	14.20	P	
9 / 05	11 / 13	ER	31	30	-1	14.30	14.35	P	
9 / 05	12 / 13	ER	31	31	0	14.30	14.35	P	
9 / 05	12 / 14	ER	31	31	0	14.44	14.49	P	
9 / 05	13 / 14	ER	31	30	-1	14.44	14.49	P	
9 / 05	13 / 15	ER	31	30	-1	14.45	14.50	P	
9 / 05	14 / 15	ER	31	30	-1	15.45	15.5	P	
9 / 05	14 / 16	ER	31	29	-2	15.45	15.5	P	
9 / 05	15 / 16	ER	31	31	0	15.57	16.02	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 05	15 / 17	ER	31	30	-1	16.10	16.15	P	
9 / 05	15 / 17	ER	31	31	0	15.57	16.02	P	
9 / 05	16 / 17	ER	31	30	-1	15.57	16.02	P	
9 / 05	17 / 18	ER	31	29	-2	16.26	16.31	P	
9 / 06	18 / 19	ER	31	30	-1	09.58	10.03	P	
9 / 06	18 / 19	ER	31	28	-3	09.58	10.03	P	
9 / 06	18 / 20	ER	31	28	-3	09.58	10.03	P	
9 / 06	19 / 20	ER	31	29	-2	10.05	10.10	P	
9 / 06	19 / 21	ER	31	30	-1	10.05	10.10	P	
9 / 06	20 / 21	ER	31	29	-2	10.05	10.10	P	
9 / 06	20 / 22	ER	31	30	-1	10.12	10.17	P	
9 / 06	22 / 23	ER	31	31	0	10.44	10.49	P	
9 / 06	22 / 24	ER	31	29	-2	10.44	10.49	P	
9 / 06	21 / 23	ER	31	30	-1	10.15	10.20	P	
9 / 06	21 / 22	ER	31	31	0	10.12	10.17	P	

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffin, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 06	23 / 24	ER	31	30	-1	10.35	10.40	P	
9 / 06	23 / 25	ER	31	31	0	10.35	10.40	P	
9 / 06	24 / 25	ER	31	31	0	10.35	10.40	P	
9 / 06	24 / 26	ER	31	30	-1	12.22	12.27	P	
9 / 06	26 / 28	ER	31	30	-1	14.08	14.13	P	
9 / 06	25 / 27	ER	31	31	0	12.22	12.27	P	
9 / 06	27 / 28	ER	31	31	0	14.08	14.13	P	
9 / 06	28 / 29	ER	31	30	-1	14.08	14.13	P	
9 / 06	27 / 29	ER	31	29	-2	14.25	14.30	P	
9 / 06	27 / 29	ER	31	28	-3	14.18	14.23	P	
9 / 06	27 / 30	ER	31	31	0	14.18	14.23	P	
9 / 06	29 / 30	ER	31	30	-1	14.18	14.23	P	
9 / 06	30 / 31	ER	31	28	-3	14.25	14.30	P	
9 / 06	29 / 31	ER	31	28	-3	14.25	14.30	P	
9 / 06	29 / 32	ER	31	30	-1	14.36	14.41	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 06	31 / 32	ER	31	30	-1	14.36	14.41	P	
9 / 06	31 / 33	ER	31	31	0	16.14	16.19	P	
9 / 06	32 / 33	ER	31	31	0	16.14	16.19	P	
9 / 06	33 / 34	ER	31	31	0	16.22	16.27	P	
9 / 06	33 / 35	ER	31	31	0	16.22	16.27	P	
9 / 06	34 / 35	ER	31	31	0	16.22	16.27	P	
9 / 06	34 / 37	ER	31	31	0	16.30	16.35	P	
9 / 06	35 / 37	ER	31	31	0	16.30	16.35	P	
9 / 06	35 / 36	ER	31	30	-1	16.41	16.46	P	
9 / 06	36 / 37	ER	31	29	-2	16.41	16.46	P	
9 / 07	36 / 39	ER	31	29	-2	09.31	09.36	P	
9 / 07	37 / 39	ER	31	30	-1	09.31	09.36	P	
9 / 07	37 / 38	ER	31	29	-2	09.31	09.36	P	
9 / 07	38 / 39	ER	31	31	0	09.38	09.43	P	
9 / 07	40 / 41	ER	31	30	-1	09.45	09.50	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 07	39 / 41	ER	31	30	-1	09.45	09.50	P	
9 / 07	39 / 40	ER	31	31	0	09.45	09.50	P	
9 / 07	38 / 40	ER	31	31	0	09.38	09.43	P	
9 / 07	38 / 40	ER	31	31	0	09.38	09.43	P	
9 / 07	40 / 43	ER	31	29	-2	09.55	10.00	P	
9 / 07	40 / 42	ER	31	31	0	09.55	10.00	P	
9 / 07	41 / 42	ER	31	31	0	10.36	10.41	P	
9 / 07	42 / 43	ER	31	30	-1	09.55	10.00	P	
9 / 07	43 / 44	ER	31	31	0	10.47	10.52	P	
9 / 07	42 / 44	ER	31	31	0	10.47	10.52	P	
9 / 07	42 / 44	ER	31	30	-1	12.25	12.30	P	
9 / 07	42 / 45	ER	31	30	-1	12.32	12.37	P	
9 / 07	44 / 45	ER	31	31	0	12.32	12.37	P	
9 / 07	44 / 46	ER	31	30	-1	12.25	12.30	P	
9 / 07	44 / 46	ER	31	30	-1	12.25	12.30	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 07	45 / 46	ER	31	31	0	12.32	12.37	P	
9 / 07	46 / 47	ER	31	30	-1	14.30	14.35	P	
9 / 07	46 / 48	ER	31	31	0	14.30	14.35	P	
9 / 07	46 / 48	ER	31	30	-1	14.30	14.35	P	
9 / 07	47 / 48	ER	31	30	-1	14.38	14.43	P	
9 / 07	47 / 50	ER	31	31	0	14.38	14.43	P	
9 / 07	48 / 50	ER	31	30	-1	14.38	14.43	P	
9 / 07	48 / 49	ER	31	31	0	14.45	14.50	P	
9 / 07	49 / 50	ER	31	31	0	14.45	14.50	P	
9 / 07	50 / 51	ER	31	31	0	14.44	14.49	P	
9 / 07	50 / 52	ER	31	31	0	14.44	14.49	P	
9 / 07	49 / 52	ER	31	31	0	15.05	15.10	P	
9 / 07	51 / 52	ER	31	31	0	14.44	14.49	P	
9 / 07	52 / 53	ER	31	30	-1	15.22	15.27	P	
9 / 07	51 / 53	ER	31	30	-1	15.12	15.17	P	

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

NON - DESTRUCTIVE TEST LOG

Project Name: **American Chemical Services** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

			Air Test Information						
			Pressure			Time		Results	
Date Tested	**Seam Number**	**Tester Initial**	**Start P.S.I.**	**Finish P.S.I.**	**+ / -**	**Start Time**	**Finish Time**	**(P / F)**	**Locations / Comments**
9 / 07	51 / 54	ER	31	30	-1	15.12	15.17	P	
9 / 07	53 / 54	ER	31	30	-1	15.12	15.17	P	
9 / 07	53 / 55	ER	31	31	0	16.05	16.10	P	
9 / 07	54 / 55	ER	31	30	-1	16.05	16.10	P	
9 / 07	55 / 57	ER	31	31	0	16.18	1.23	P	
9 / 07	55 / 56	ER	31	31	0	16.18	1.23	P	
9 / 07	56 / 57	ER	31	31	0	16.18	1.23	P	
9 / 07	57 / 58	ER	31	31	0	16.23	16.28	P	
9 / 07	56 / 58	ER	31	30	-1	16.23	16.28	P	
9 / 07	58 / 59	ER	31	31	0	16.50	16.55	P	
9 / 07	59 / 60	ER	31	30	-1	16.50	16.55	P	
9 / 07	60 / 61	ER	31	31	0	16.50	16.55	P	
					END				

12/00 - E.D.R.

Q.C. Initials: E.D.R.

- **Field Destructive Test Log**

MID - AMERICA LINING CO.

FIELD DESTRUCTIVE TEST LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

Date	DS Number	Seam Number	Mach. Number	Seamer Initials	Peel Values - Lbs./Inches			Shear Values - Lbs./Inches			Field Pass	Lab Pass
9 / 05	1	1 / 3	C - 1	MS	97/102	97/102	98/101	125	128	130	P	P
					102/113	97/105		122	127			
9 / 05	2	3 / 4	C - 4	MSO	109/120	104/150	107/121	121	124	122	P	P
					95/114	103/105		124	127			
9 / 05	3	4 / 6	C - 1	MS	99/110	95/118	105/108	126	127	127	P	P
					101/122	97/109		117	123			
9 / 05	4	8 / 9	C - 1	MS	97/100	104/104	98/103	118	122	124	P	P
					98/102	100/101		124	125			
9 / 05	5	10 / 11	C - 4	MSO	101/105	102/103	98/106	118	122	121	P	P
					94/97	101/107		119	123			
9 / 05	6	12 / 13	C - 1	MS	103/104	103/111	101/105	111	118	115	P	P
					97/100	101/107		119	120			
9 / 05	7	14 / 16	C - 4	MSO	91/99	105/106	95/102	112	114	114	P	P
					93/103	96/100		114	121			
9 / 05	8	15 / 17	C - 1	MS	96/97	96/100	94/98	106	108	113	P	P
					96/100	93/95		114	115			
9 / 06	9	18 / 20	C - 1	MS	105/108	111/114	105/109	115	129	128	P	P
					104/114	107/108		131	132			
9 / 06	10	20 / 22	C - 4	MSO	102/110	105/106	105/110	127	129	132	P	P
					106/120	97/108		129	129			
9 / 06	11	22 / 24	C - 1	MS	101/109	94/112	109/111	124	124	125	P	P
					93/109	102/109		126	126			
9 / 06	12	24 / 26	C - 4	MSO	98/109	101/108	108/110	119	123	122	P	P
					113/115	105/112		122	123			
9 / 06	13	25 / 27	C - 1	MS	108/110	102/104	106/106	120	124	123	P	P
					106/107	101/107		116	117			
9 / 06	14	28 / 29	C - 4	MSO	95/106	98/99	98/98	99	99	110	P	P
					101/101	96/100		118	119			
9 / 06	15	31 / 33	C - 4	MSO	111/121	93/101	91/98	111	114	93	P	P
					97/102	91/110		117	104			

12/00 - E.D.R.

Q.C. Initials: E.D.R.

FIELD DESTRUCTIVE TEST LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

Date	DS Number	Seam Number	Mach. Number	Seamer Initials	Peel Values - Lbs./Inches			Shear Values - Lbs./Inches			Field Pass	Lab Pass
9 / 06	16	33 / 35	C - 1	MS	99/111	98/109	93/96	124	124	130	P	P
					109/111	108/110		118	123			
9 / 06	17	35 / 37	C - 1	MS	104/121	106/115	129/129	120	129	112	P	P
					104/106	105/111		112	114			
9 / 06	18	R 29 / P10	MX - 0	AG	85	87	91	112	112	115	P	P
					93	96		116	117			
9 / 07	19	37 / 38	C - 1	MS	82/85	79/80	79/81	90	91	92	P	P
					78/82	80/83		93	94			
9 / 07	20	39 / 41	C - 4	MSO	88/90	84/88	86/90	95	101	98	P	P
					81/89	87/89		96	97			
9 / 07	21	43 / 44	C - 4	MSO	92/94	89/93	90/92	96	98	98	P	P
					83/92	93/95		99	101			
9 / 07	22	44 / 46	C - 1	MS	87/87	82/88	84/88	99	100	101	P	P
					85/89	87/92		91	98			
9 / 07	23	46 / 48	C - 4	MSO	87/90	88/92	84/87	88	90	93	P	P
					81/85	83/87		94	95			
9 / 07	24	48 / 50	C - 1	MS	87/88	85/88	82/96	91	92	95	P	P
					85/87	80/81		92	96			
9 / 07	25	52 / 53	C - 4	MSO	88/92	89/92	89/90	102	103	103	P	P
					91/95	92/94		104	105			
9 / 07	26	53 / 55	C - 1	MS	87/94	84/89	89/91	98	99	100	P	P
					87/92	89/90		101	106			
9 / 07	27	56 / 58	C - 1	MS	85/89	87/88	89/91	96	97	98	P	P
					90/92	89/91		99	100			
9 / 07	28	58 / 59	C - 4	MSO	82/85	87/88	83/85	95	96	97	P	P
					86/88	81/85		98	100			
9 / 07	29	R 50 / P24	MX - 0	AG	77	81	84	90	91	92	P	EF
					82	38		93	94			
9 / 09	30	R 136 / P 35	MX - 0	AG	84	86	87	90	91	92	P	P
					85	89		93	94			

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

FIELD DESTRUCTIVE TEST LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil L.L.D.P.E.

Date	DS Number	Seam Number	Mach. Number	Seamer Initials	Peel Values - Lbs./Inches			Shear Values - Lbs./Inches			Field Pass	Lab Pass
9 / 09	29A	R 50 / P 24	MX - 0	AG	78 75	72 84	85	97 83	98 88	89	P	P
9 / 09	29B	R 50 / P 24	MX - 0	AG	73 73	75 79	77	75 88	85 89	88	P	P

12/00 - E.D.R.

Q.C. Initials: E.D.R.

- **Laboratory Destructive Test Results**

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

September 9, 2002

Mail To:
Mr. Steve Palmer
E.C.I.
5290 Nimitz Rd.
Loves Park, IL 61111

fax: 219-924-4561

Dear Mr. Palmer:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	2176-14-04
Date Received:	09-09-02
Material(s) Tested:	8 LLDPE heat fusion weld seams
Test(s) Requested:	Peel & Shear Strength (ASTM D 6392)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Melissa Hunter
Project Manager
Geosynthetic Services Division

SEAMS RESULTS ATTACHED

SEAM TEST REPORT LEGEND

Seam Failure Modes (as per NSF 54, Appendix A)

FTB:	Film Tearing Bond
BLF:	Brittle Liner Failure
NON FTB:	Non Film Tearing Bond

Locus/Break Codes: Dielectric/Solvent Welds

CL:	Break in sheeting at clamp edge.
BRK:	Break in sheeting.
SE:	Break at seam edge.
AD-BRK:	Break in sheeting after some adhesion failure between sheets.
AD:	Failure in adhesion between sheets.
SIP:	Separation in plane.

Locus/Break Codes: Fillet Weld Seams

AD1:	Failure in adhesion. Specimens delaminate under bead and break through the extruded material in outer region.
AD2:	Failure in adhesion.
AD-WL:	Break through fillet weld.
SE:	Break at seam edge.
AD-BRK:	Break in bottom sheeting after some adhesion failure between the fillet and the bottom sheet (applicable to peel only).
HT:	Break at the edge of the hot tack for specimens which could not be delaminated in the hot tack.

Locus/Break Codes: Fabric Reinforced Liner

AD:	Adhesion failure resulting in delamination in the plane of the bond.
DEL:	Delamination in the plane of the scrim (peel only).
AD-DEL:	Delamination in the plane of the scrim after some delamination in the plane of the bond (peel only).
BRK:	Break in sheet through both the fabric and the plies of the polymer.
FP:	Fabric pullout. Pullout of threads parallel to the direction of test followed by break in polymeric sheeting.
SIP:	Separation in plane.

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-14-04**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-1	1A	107	<10	SE	FTB	NR	126	> 50	FTB	NR
	2A	106	<10	SE	FTB					
	3A	107	<10	SE	FTB		129	> 50	FTB	
	4A	105	<10	SE	FTB					
	5A	106	<10	SE	FTB		132	> 50	FTB	
	MEAN:	**106**								
	1B	109	<10	SE	FTB		119	> 50	FTB	
	2B	112	<10	SE	FTB					
	3B	95	<10	SE	FTB		129	> 50	FTB	
	4B	121	<10	SE	FTB					
	5B	106	<10	SE	FTB					
	MEAN:	**109**				**MEAN:**	**127**			
DS-2	1A	129	<10	SE	FTB	NR	132	> 50	FTB	NR
	2A	120	<10	SE	FTB					
	3A	124	<10	SE	FTB		131	> 50	FTB	
	4A	124	<10	SE	FTB					
	5A	123	<10	SE	FTB		131	> 50	FTB	
	MEAN:	**124**								
	1B	129	<10	SE	FTB		127	> 50	FTB	
	2B	125	<10	SE	FTB					
	3B	126	<10	SE	FTB		127	> 50	FTB	
	4B	127	<10	SE	FTB					
	5B	127	<10	SE	FTB					
	MEAN:	**127**				**MEAN:**	**130**			

NR: Not Requested

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-14-04**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	113	<10	SE	FTB	NR	132	> 50	FTB	NR
	2A	110	<10	SE	FTB					
	3A	117	<10	SE	FTB		124	> 50	FTB	
	4A	114	<10	SE	FTB					
	5A	113	<10	SE	FTB		131	> 50	FTB	
DS-3	**MEAN:**	**113**								
	1B	107	<10	SE	FTB		131	> 50	FTB	
	2B	107	<10	SE	FTB					
	3B	107	<10	SE	FTB		131	> 50	FTB	
	4B	103	<10	SE	FTB					
	5B	103	<10	SE	FTB					
	MEAN:	**105**				**MEAN:**	**130**			
	1A	105	<10	SE	FTB	NR	139	> 50	FTB	NR
	2A	100	<10	SE	FTB					
	3A	106	<10	SE	FTB		136	> 50	FTB	
	4A	106	<10	SE	FTB					
	5A	102	<10	SE	FTB		112	> 50	FTB	
DS-4	**MEAN:**	**104**								
	1B	104	<10	SE	FTB		135	> 50	FTB	
	2B	100	<10	SE	FTB					
	3B	108	<10	SE	FTB		134	> 50	FTB	
	4B	107	<10	SE	FTB					
	5B	108	<10	SE	FTB					
	MEAN:	**105**				**MEAN:**	**131**			

NR: Not Requested

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-14-04**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-5	1A	107	<10	SE	FTB	NR	134	> 50	FTB	NR
	2A	107	<10	SE	FTB					
	3A	109	<10	SE	FTB		131	> 50	FTB	
	4A	107	<10	SE	FTB					
	5A	108	<10	SE	FTB		130	> 50	FTB	
	MEAN:	**108**								
	1B	112	<10	SE	FTB		122	> 50	FTB	
	2B	112	<10	SE	FTB					
	3B	113	<10	SE	FTB		119	> 50	FTB	
	4B	115	<10	SE	FTB					
	5B	107	<10	SE	FTB					
	MEAN:	**112**				**MEAN:**	**127**			
DS-6	1A	111	<10	SE	FTB	NR	129	> 50	FTB	NR
	2A	109	<10	SE	FTB					
	3A	112	<10	SE	FTB		107	> 50	FTB	
	4A	115	<10	SE	FTB					
	5A	124	<10	SE	FTB		130	> 50	FTB	
	MEAN:	**114**								
	1B	109	<10	SE	FTB		114	> 50	FTB	
	2B	103	<10	SE	FTB					
	3B	116	<10	SE	FTB		129	> 50	FTB	
	4B	110	<10	SE	FTB					
	5B	109	<10	SE	FTB					
	MEAN:	**109**				**MEAN:**	**122**			

NR: Not Requested

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-14-04**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-7	1A	105	<10	SE	FTB	NR	129	> 50	FTB	NR
	2A	104	<10	SE	FTB					
	3A	110	<10	SE	FTB		127	> 50	FTB	
	4A	115	<10	SE	FTB					
	5A	120	<10	SE	FTB		129	> 50	FTB	
	MEAN:	**111**								
	1B	104	<10	SE	FTB		101	> 50	FTB	
	2B	104	<10	SE	FTB					
	3B	105	<10	SE	FTB		126	> 50	FTB	
	4B	106	<10	SE	FTB					
	5B	106	<10	SE	FTB					
	MEAN:	**105**				**MEAN:**	**122**			
DS-8	1A	107	<10	SE	FTB	NR	131	> 50	FTB	NR
	2A	112	<10	SE	FTB					
	3A	108	<10	SE	FTB		128	> 50	FTB	
	4A	107	<10	SE	FTB					
	5A	108	<10	SE	FTB		131	> 50	FTB	
	MEAN:	**108**								
	1B	115	<10	SE	FTB		131	> 50	FTB	
	2B	109	<10	SE	FTB					
	3B	114	<10	SE	FTB		131	> 50	FTB	
	4B	112	<10	SE	FTB					
	5B	107	<10	SE	FTB					
	MEAN:	**111**				**MEAN:**	**130**			

NR: Not Requested

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply *to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.* TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

SEP 16 2002

September 10, 2002

Mail To:
Mr. Steve Palmer
E.C.I.
5290 Nimitz Rd.
Loves Park, IL 61111

fax: 219-924-4561

Dear Mr. Palmer:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

TRI Job Reference Number:	2176-16-07
Date Received:	09-10-02
Material(s) Tested:	19 LLDPE heat fusion weld seams 2 LLDPE single track extrusion weld seams
Test(s) Requested:	Peel & Shear Strength (ASTM D 6392)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Melissa Hunter (SRH for)

Melissa Hunter
Project Manager
Geosynthetic Services Division

SEAMS RESULTS ATTACHED

SEAM TEST REPORT LEGEND

Seam Failure Modes (as per NSF 54, Appendix A)

FTB:	Film Tearing Bond
BLF:	Brittle Liner Failure
NON FTB:	Non Film Tearing Bond

Locus/Break Codes: Dielectric/Solvent Welds

CL:	Break in sheeting at clamp edge.
BRK:	Break in sheeting.
SE:	Break at seam edge.
AD-BRK:	Break in sheeting after some adhesion failure between sheets.
AD:	Failure in adhesion between sheets.
SIP:	Separation in plane.

Locus/Break Codes: Fillet Weld Seams

AD1:	Failure in adhesion. Specimens delaminate under bead and break through the extruded material in outer region.
AD2:	Failure in adhesion.
AD-WL:	Break through fillet weld.
SE:	Break at seam edge.
AD-BRK:	Break in bottom sheeting after some adhesion failure between the fillet and the bottom sheet (applicable to peel only).
HT:	Break at the edge of the hot tack for specimens which could not be delaminated in the hot tack.

Locus/Break Codes: Fabric Reinforced Liner

AD:	Adhesion failure resulting in delamination in the plane of the bond.
DEL:	Delamination in the plane of the scrim (peel only).
AD-DEL:	Delamination in the plane of the scrim after some delamination in the plane of the bond (peel only).
BRK:	Break in sheet through both the fabric and the plies of the polymer.
FP:	Fabric pullout. Pullout of threads parallel to the direction of test followed by break in polymeric sheeting.
SIP:	Separation in plane.

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-9	1A	112	<10	SE	FTB	NR	133	> 50	FTB	NR
	2A	118	<10	SE	FTB					
	3A	111	<10	SE	FTB		120	> 50	FTB	
	4A	111	<10	SE	FTB					
	5A	113	<10	SE	FTB		133	> 50	FTB	
	MEAN:	**113**								
	1B	101	<10	SE	FTB		132	> 50	FTB	
	2B	103	<10	SE	FTB					
	3B	103	<10	SE	FTB		129	> 50	FTB	
	4B	104	<10	SE	FTB					
	5B	102	<10	SE	FTB					
	MEAN:	**103**				**MEAN:**	**129**			
DS-10	1A	120	<10	SE	FTB	NR	135	> 50	FTB	NR
	2A	119	<10	SE	FTB					
	3A	124	<10	SE	FTB		133	> 50	FTB	
	4A	110	<10	SE	FTB					
	5A	74	<10	SE	FTB		133	> 50	FTB	
	MEAN:	**109**								
	1B	104	<10	SE	FTB		132	> 50	FTB	
	2B	101	<10	SE	FTB					
	3B	106	<10	SE	FTB		133	> 50	FTB	
	4B	111	<10	SE	FTB					
	5B	118	<10	SE	FTB					
	MEAN:	**108**				**MEAN:**	**133**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-11	1A	116	<10	SE	FTB	NR	129	> 50	FTB	NR
	2A	121	<10	SE	FTB					
	3A	124	<10	SE	FTB		127	> 50	FTB	
	4A	118	<10	SE	FTB					
	5A	119	<10	SE	FTB		129	> 50	FTB	
	MEAN:	**120**								
	1B	108	<10	SE	FTB		131	> 50	FTB	
	2B	119	<10	SE	FTB					
	3B	110	<10	SE	FTB		129	> 50	FTB	
	4B	111	<10	SE	FTB					
	5B	110	<10	SE	FTB					
	MEAN:	**112**				**MEAN:**	**129**			
DS-12	1A	125	<10	SE	FTB	NR	135	> 50	FTB	NR
	2A	126	<10	SE	FTB					
	3A	122	<10	SE	FTB		136	> 50	FTB	
	4A	122	<10	SE	FTB					
	5A	120	<10	SE	FTB		121	> 50	FTB	
	MEAN:	**123**								
	1B	130	<10	SE	FTB		132	> 50	FTB	
	2B	128	<10	SE	FTB					
	3B	124	<10	SE	FTB		131	> 50	FTB	
	4B	123	<10	SE	FTB					
	5B	113	<10	SE	FTB					
	MEAN:	**124**				**MEAN:**	**131**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-13	1A	109	<10	SE	FTB	NR	135	> 50	FTB	NR
	2A	102	<10	SE	FTB					
	3A	116	<10	SE	FTB		130	> 50	FTB	
	4A	110	<10	SE	FTB					
	5A	105	<10	SE	FTB		133	> 50	FTB	
	MEAN:	**108**								
	1B	117	<10	SE	FTB		128	> 50	FTB	
	2B	112	<10	SE	FTB					
	3B	112	<10	SE	FTB		125	> 50	FTB	
	4B	113	<10	SE	FTB					
	5B	113	<10	SE	FTB					
	MEAN:	**113**				**MEAN:**	**130**			
DS-14	1A	107	<10	SE	FTB	NR	137	> 50	FTB	NR
	2A	112	<10	SE	FTB					
	3A	107	<10	SE	FTB		138	> 50	FTB	
	4A	107	<10	SE	FTB					
	5A	100	<10	SE	FTB		138	> 50	FTB	
	MEAN:	**107**								
	1B	112	<10	SE	FTB		135	> 50	FTB	
	2B	113	<10	SE	FTB					
	3B	112	<10	SE	FTB		136	> 50	FTB	
	4B	112	<10	SE	FTB					
	5B	114	<10	SE	FTB					
	MEAN:	**113**				**MEAN:**	**137**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-15	1A	116	<10	SE	FTB	NR	139	> 50	FTB	NR
	2A	104	<10	SE	FTB					
	3A	105	<10	SE	FTB		138	> 50	FTB	
	4A	107	<10	SE	FTB					
	5A	104	<10	SE	FTB		139	> 50	FTB	
	MEAN:	**107**								
	1B	113	<10	SE	FTB		139	> 50	FTB	
	2B	110	<10	SE	FTB					
	3B	111	<10	SE	FTB		139	> 50	FTB	
	4B	112	<10	SE	FTB					
	5B	106	<10	SE	FTB					
	MEAN:	**110**				**MEAN:**	**139**			
DS-16	1A	107	<10	SE	FTB	NR	142	> 50	FTB	NR
	2A	112	<10	SE	FTB					
	3A	109	<10	SE	FTB		137	> 50	FTB	
	4A	103	<10	SE	FTB					
	5A	107	<10	SE	FTB		140	> 50	FTB	
	MEAN:	**108**								
	1B	107	<10	SE	FTB		138	> 50	FTB	
	2B	109	<10	SE	FTB					
	3B	129	<10	SE	FTB		139	> 50	FTB	
	4B	106	<10	SE	FTB					
	5B	108	<10	SE	FTB					
	MEAN:	**112**				**MEAN:**	**139**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	119	<10	SE	FTB	NR	142	> 50	FTB	NR
	2A	111	<10	SE	FTB					
	3A	121	<10	SE	FTB		143	> 50	FTB	
	4A	119	<10	SE	FTB					
	5A	118	<10	SE	FTB		144	> 50	FTB	
DS-17	**MEAN:**	**118**								
	1B	117	<10	SE	FTB		144	> 50	FTB	
	2B	122	<10	SE	FTB					
	3B	115	<10	SE	FTB		146	> 50	FTB	
	4B	123	<10	SE	FTB					
	5B	121	<10	SE	FTB					
	MEAN:	**120**				**MEAN:**	**144**			

NR: *Not Requested*

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: SINGLE TRACK EXTRUSION WELD SEA** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1	101	<10	SE	FTB	NR	140	> 50	FTB	NR
	2	115	<10	SE	FTB					
	3	118	<10	SE	FTB		149	> 50	FTB	
	4	104	<10	SE	FTB					
	5	100	<10	SE	FTB		144	> 50	FTB	
DS-18	**MEAN:**	**108**								
							143	> 50	FTB	
							141	> 50	FTB	
						MEAN:	**143**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	111	<10	SE	FTB	NR	139	> 50	FTB	NR
	2A	111	<10	SE	FTB					
	3A	111	<10	SE	FTB		139	> 50	FTB	
	4A	111	<10	SE	FTB					
	5A	112	<10	SE	FTB		143	> 50	FTB	
DS-19	**MEAN:**	**111**								
	1B	105	<10	SE	FTB		142	> 50	FTB	
	2B	105	<10	SE	FTB					
	3B	99	<10	SE	FTB		143	> 50	FTB	
	4B	105	<10	SE	FTB					
	5B	105	<10	SE	FTB					
	MEAN:	**104**				**MEAN:**	**141**			
	1A	107	<10	SE	FTB	NR	134	> 50	FTB	NR
	2A	117	<10	SE	FTB					
	3A	119	<10	SE	FTB		136	> 50	FTB	
	4A	113	<10	SE	FTB					
	5A	115	<10	SE	FTB		135	> 50	FTB	
DS-20	**MEAN:**	**114**								
	1B	111	<10	SE	FTB		135	> 50	FTB	
	2B	106	<10	SE	FTB					
	3B	106	<10	SE	FTB		134	> 50	FTB	
	4B	106	<10	SE	FTB					
	5B	105	<10	SE	FTB					
	MEAN:	**107**				**MEAN:**	**135**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	120	<10	SE	FTB	NR	133	> 50	FTB	NR
	2A	115	<10	SE	FTB					
	3A	115	<10	SE	FTB		136	> 50	FTB	
	4A	115	<10	SE	FTB					
	5A	117	<10	SE	FTB		135	> 50	FTB	
DS-21	**MEAN:**	**116**								
	1B	116	<10	SE	FTB		139	> 50	FTB	
	2B	112	<10	SE	FTB					
	3B	114	<10	SE	FTB		133	> 50	FTB	
	4B	116	<10	SE	FTB					
	5B	111	<10	SE	FTB					
	MEAN:	**114**				**MEAN:**	**135**			
	1A	106	<10	SE	FTB	NR	140	> 50	FTB	NR
	2A	105	<10	SE	FTB					
	3A	102	<10	SE	FTB		140	> 50	FTB	
	4A	113	<10	SE	FTB					
	5A	109	<10	SE	FTB		139	> 50	FTB	
DS-22	**MEAN:**	**107**								
	1B	100	<10	SE	FTB		139	> 50	FTB	
	2B	107	<10	SE	FTB					
	3B	108	<10	SE	FTB		139	> 50	FTB	
	4B	106	<10	SE	FTB					
	5B	105	<10	SE	FTB					
	MEAN:	**105**				**MEAN:**	**139**			

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CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-23	1A	112	<10	SE	FTB	NR	120	> 50	FTB	NR
	2A	115	<10	SE	FTB					
	3A	114	<10	SE	FTB		122	> 50	FTB	
	4A	105	<10	SE	FTB					
	5A	118	<10	SE	FTB		121	> 50	FTB	
	MEAN:	**113**								
	1B	105	<10	SE	FTB		124	> 50	FTB	
	2B	115	<10	SE	FTB					
	3B	122	<10	SE	FTB		124	> 50	FTB	
	4B	119	<10	SE	FTB					
	5B	105	<10	SE	FTB					
	MEAN:	**113**				**MEAN:**	**122**			
DS-24	1A	110	<10	SE	FTB	NR	125	> 50	FTB	NR
	2A	113	<10	SE	FTB					
	3A	109	<10	SE	FTB		129	> 50	FTB	
	4A	110	<10	SE	FTB					
	5A	111	<10	SE	FTB		127	> 50	FTB	
	MEAN:	**111**								
	1B	120	<10	SE	FTB		129	> 50	FTB	
	2B	118	<10	SE	FTB					
	3B	120	<10	SE	FTB		128	> 50	FTB	
	4B	109	<10	SE	FTB					
	5B	118	<10	SE	FTB					
	MEAN:	**117**				**MEAN:**	**128**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-25	1A	127	<10	SE	FTB	NR	129	> 50	FTB	NR
	2A	123	<10	SE	FTB					
	3A	116	<10	SE	FTB		135	> 50	FTB	
	4A	111	<10	SE	FTB					
	5A	122	<10	SE	FTB		133	> 50	FTB	
	MEAN:	**120**								
	1B	120	<10	SE	FTB		132	> 50	FTB	
	2B	114	<10	SE	FTB					
	3B	116	<10	SE	FTB		133	> 50	FTB	
	4B	124	<10	SE	FTB					
	5B	122	<10	SE	FTB					
	MEAN:	**119**				**MEAN:**	**132**			
DS-26	1A	124	<10	SE	FTB	NR	130	> 50	FTB	NR
	2A	121	<10	SE	FTB					
	3A	116	<10	SE	FTB		134	> 50	FTB	
	4A	118	<10	SE	FTB					
	5A	115	<10	SE	FTB		132	> 50	FTB	
	MEAN:	**119**								
	1B	107	<10	SE	FTB		131	> 50	FTB	
	2B	133	<10	SE	FTB					
	3B	124	<10	SE	FTB		122	> 50	FTB	
	4B	111	<10	SE	FTB					
	5B	111	<10	SE	FTB					
	MEAN:	**117**				**MEAN:**	**130**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: HEAT FUSION WELD** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	107	<10	SE	FTB	NR	129	> 50	FTB	NR
	2A	110	<10	SE	FTB					
	3A	106	<10	SE	FTB		128	> 50	FTB	
	4A	107	<10	SE	FTB					
	5A	113	<10	SE	FTB		128	> 50	FTB	
DS-27	**MEAN:**	**109**								
	1B	109	<10	SE	FTB		128	> 50	FTB	
	2B	111	<10	SE	FTB					
	3B	114	<10	SE	FTB		126	> 50	FTB	
	4B	107	<10	SE	FTB					
	5B	106	<10	SE	FTB					
	MEAN:	**109**				**MEAN:**	**128**			
	1A	104	<10	SE	FTB	NR	125	> 50	FTB	NR
	2A	107	<10	SE	FTB					
	3A	105	<10	SE	FTB		130	> 50	FTB	
	4A	107	<10	SE	FTB					
	5A	104	<10	SE	FTB		125	> 50	FTB	
DS-28	**MEAN:**	**105**								
	1B	117	<10	SE	FTB		128	> 50	FTB	
	2B	114	<10	SE	FTB					
	3B	111	<10	SE	FTB		124	> 50	FTB	
	4B	119	<10	SE	FTB					
	5B	108	<10	SE	FTB					
	MEAN:	**114**				**MEAN:**	**126**			

NR: Not Requested

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL:** LLDPE **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE:** SINGLE TRACK EXTRUSION WELD SEA **ANALYST:** MPP
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #:** E2176-16-07

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1	99	<10	SE	FTB	NR	131	> 50	FTB	NR
	2	98	50	AD-BRK	FTB					
	3	100	<10	SE	FTB		134	> 50	FTB	
	4	104	<10	SE	FTB					
	5	100	40	AD-BRK	FTB		133	> 50	FTB	
DS-29	**MEAN:**	**100**					136	> 50	FTB	
							139	> 50	FTB	
						MEAN:	**135**			
	1	140	<10	SE	FTB	NR	124	> 50	FTB	NR
	2	137	<10	SE	FTB					
	3	141	<10	SE	FTB		138	> 50	FTB	
	4	138	<10	SE	FTB					
	5	136	<10	SE	FTB		138	> 50	FTB	
DS-30	**MEAN:**	**138**					140	> 50	FTB	
							139	> 50	FTB	
						MEAN:	**136**			

NR: Not Requested

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

SEP 1 6 2002

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

September 11, 2002

Mail To:
Mr. Steve Palmer
E.C.I.
5290 Nimitz Rd.
Loves Park, IL 61111

fax: 219-924-4561

Dear Mr. Palmer:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	American Chemical Services
TRI Job Reference Number:	2176-18-05
Date Received:	09-11-02
Material(s) Tested:	2 single track extrusion weld seams
Test(s) Requested:	Peel & Shear Strength (ASTM D 6392)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Melissa Hunter
Project Manager
Geosynthetic Services Division

SEAMS RESULTS ATTACHED

SEAM TEST REPORT LEGEND

Seam Failure Modes (as per NSF 54, Appendix A)

FTB:	Film Tearing Bond
BLF:	Brittle Liner Failure
NON FTB:	Non Film Tearing Bond

Locus/Break Codes: Dielectric/Solvent Welds

CL:	Break in sheeting at clamp edge.
BRK:	Break in sheeting.
SE:	Break at seam edge.
AD-BRK:	Break in sheeting after some adhesion failure between sheets.
AD:	Failure in adhesion between sheets.
SIP:	Separation in plane.

Locus/Break Codes: Fillet Weld Seams

AD1:	Failure in adhesion. Specimens delaminate under bead and break through the extruded material in outer region.
AD2:	Failure in adhesion.
AD-WL:	Break through fillet weld.
SE:	Break at seam edge.
AD-BRK:	Break in bottom sheeting after some adhesion failure between the fillet and the bottom sheet (applicable to peel only).
HT:	Break at the edge of the hot tack for specimens which could not be delaminated in the hot tack.

Locus/Break Codes: Fabric Reinforced Liner

AD:	Adhesion failure resulting in delamination in the plane of the bond.
DEL:	Delamination in the plane of the scrim (peel only).
AD-DEL:	Delamination in the plane of the scrim after some delamination in the plane of the bond (peel only).
BRK:	Break in sheet through both the fabric and the plies of the polymer.
FP:	*Fabric pullout. Pullout of threads parallel to the direction of test* followed by break in polymeric sheeting.
SIP:	Separation in plane.

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: E.C.I. **MATERIAL: LLDPE** **ASTM D 6392/4437**
CONTACT: MR. STEVE PALMER **SEAM TYPE: SINGLE TRACK EXTRUSION WELD SEA** **ANALYST: MPP**
PROJECT: AMERICAN CHEMICAL SERVICES **TRI LOG #: E2176-16-07**

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-29A	1	122	<10	SE	FTB	NR	128	> 50	FTB	NR
	2	129	<10	SE	FTB					
	3	119	<10	SE	FTB		126	> 50	FTB	
	4	130	<10	SE	FTB					
	5	127	<10	SE	FTB		126	> 50	FTB	
	MEAN:	**125**					136	> 50	FTB	
							123	> 50	FTB	
						MEAN:	**128**			
DS-29B	1	127	<10	SE	FTB	NR	125	> 50	FTB	NR
	2	137	<10	SE	FTB					
	3	127	<10	SE	FTB		130	> 50	FTB	
	4	129	<10	SE	FTB					
	5	127	<10	SE	FTB		126	> 50	FTB	
	MEAN:	**129**					131	> 50	FTB	
							128	> 50	FTB	
						MEAN:	**128**			

NR: Not Requested

- **Repair Log**

MID-AMERICA LINING

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 06	AG	MX - 0	9 / 09	JS	P	1 / 3	**1**	10' **DS - 01** (2' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	Panel 1	**2**	32' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	1 / 2 / 3	**3**	232' "T" (2' x 2')
9 / 07	AG	MX - 0	9 / 09	JS	P	Panel 2	**4**	272' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	Panel 4	**5**	328' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	2 / 3 / 4	**6**	250' "T" (2' x 2')
9 / 06	P	MX - 0	9 / 09	JS	P	Panel 4	**7**	243' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	3 / 4	**8**	202' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	3 / 4	**9**	195' **DS - 02** (2' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	3 / 4 / 5	**10**	132' "T" (2' x 2')
9 / 06	AG	MX - 0	9 / 09	JS	P	5 / 6 / 7	**11**	30' "T" (2' x 2')
9 / 06	AG	MX - 0	9 / 09	JS	P	Panel 6	**12**	130' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	4 / 5 / 6	**13**	140' "T" (2' x 2')
9 / 06	AG	MX - 0	9 / 09	JS	P	Panel 6	**14**	172' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9 / 09	JS	P	Panel 6	**15**	233' **Boot** (4' x 4')

Q.C. Initials: E.D.R.

MID AMERICA LINING

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 06	AG	MX - 0	9/09	JS	P	4/6	**16**	300' **DS - 03** (2' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 6	**17**	308' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	6/7/8	**18**	40' "T" (2' x 2')
9 / 07	AG	MX - 0	9/09	JS	P	8/9	**19**	30' **DS - 04** (2' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 9	**20**	20' **Boot (Cleanout)** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	8/9/10	**21**	46' "T" (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 10	**22**	148' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 8	**23**	210' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 10	**24**	240' (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 10	**25**	250' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 8	**26**	282' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	10/11	**27**	250' **DS - 05** (2' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	10/11/12	**28**	244' "T" (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	Panel 10	**29**	96' **Boot** (4' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	9/10/12	**30**	54' "T" (2' x 2')

Q.C. Initials: E.D.R.

MID-AMERICA LINING Co.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 06	AG	MX - 0	9/09	JS	P	12/13/14	**31**	154' "T" (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	12/13	**32**	230' **DS - 06** (2' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	11/12/13	**33**	250' "T" (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	13/14/15	**34**	162' "T" (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	14/15/16	**35**	64' "T" (2' x 2')
9 / 06	AG	MX - 0	9/09	JS	P	14/16	**36**	50' **DS - 07** (2' x 4')
9 / 06	AG	MX - 0	9/09	JS	P	15/16/17	**37**	74' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 10	JS	P	Panel 15	**38**	384' **Boot** (Manhole) (8' x 8')
9 / 06	AG	MX - 0	9 / 10	JS	P	15/17	**39**	396' DS - 08 (2' x 4')
9 / 07	AG	MX - 0	9/09	JS	P	18/20	**40**	75' **DS - 09** (2' x 4')
9 / 07	AG	MX - 0	9/09	JS	P	18/19/20	**41**	362' "T" (2' x 2')
9 / 10	CS	MX - 08	9 / 10	JS	P	18/19	**42**	409' **Boot** (Manhole) (8' x 8')
9 / 07	AG	MX - 0	9/09	JS	P	19/20/21	**43**	366' "T" (2' x 2')
9 / 07	AG	MX - 0	9/09	JS	P	20/21/22	**44**	308' "T" (2' x 2')
9 / 07	AG	MX - 0	9/09	JS	P	20/22	**45**	300' DS - 10 (2' x 4')

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 07	AG	MX - 0	9 / 09	JS	P	22/24	**46**	210' **DS - 11** (2' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	22/23/24	**47**	252' "T" (2' x 2')
9 / 07	AG	MX - 0	9 / 09	JS	P	21/22/23	**48**	306' "T" (2' x 2')
9 / 07	AG	MX - 0	9 / 09	JS	P	23/24/25	**49**	248' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 09	JS	P	24/25/26	**50**	176' - 210' (14' x 34')
9 / 07	AG	MX - 0	9 / 09	JS	P	24/26	**51**	160' **DS - 12** (2' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	26/28	**52**	132' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	27/28	**53**	170' - 184' (2' x 14')
9 / 07	AG	MX - 0	9 / 09	JS	P	25/27	**54**	180' **DS - 13** (2' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	27/29/30	**55**	310' "T" (2' x 2')
9 / 07	AG	MX - 0	9 / 09	JS	P	27/29	**56**	220' (2' x 2')
9 / 07	AG	MX - 0	9 / 09	JS	P	27/29	**57**	193' (2' x 2')
9 / 09	CS	MX - 08	9 / 09	JS	P	27/28/29	**58**	183' "T" & **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	28/29	**59**	96' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	28/29	**60**	15' **DS - 14** (2' x 4')

Q.C. Initials: E.D.R.

MIL - AMERICA LINING CO.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 07	AG	MX - 0	9 / 09	JS	P	29/31/32	**61**	46' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 09	JS	P	Panel 31	**62**	138' **Boot** (4' x 4')
9 / 09	CS	MX - 08	9 / 09	JS	P	Panel 31	**63**	232' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	29/30/31	**64**	304' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	Panel 33	**65**	404' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	31/33	**66**	355' **DS - 15** (2' x 4')
9 / 09	CS	MX - 08	9 / 09	JS	P	Panel 31	**67**	195' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	Panel 31	**68**	75' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	31/32/33	**69**	40' "T" (2' x 2')
9 / 07	AG	MX - 0	9 / 10	JS	P	Panel 35	**70**	110' **Boot** (4' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	33/35	**71**	160' **DS - 16** (2' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	33/34/35	**72**	376' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 10	JS	P	34/35/37	**73**	376' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 10	JS	P	Panel 37	**74**	226' **Boot** (4' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	35/37	**75**	165' **DS - 17** (2' x 4')

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 09	CS	MX - 08	9 / 10	JS	P	Panel 35	**76**	158' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 10	JS	P	35/36/37	**77**	106' "T" (2' x 2')
9 / 07	AG	MX - 0	9 / 10	JS	P	Panel 36	**78**	58' **Boot** (4' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	R 29/P10	**79**	**Extrusion DS - 18** (2' x 4')
9 / 07	AG	MX - 0	9 / 09	JS	P	18/20	**80**	358' (2' x 2')
9 / 09	AG	MX - 0	9 / 09	JS	P	24/26	**81**	170' (2' x 2')
9 / 09	CS	MX - 08	9 / 09	JS	P	37/38	**82**	404' **DS - 19** (2' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	37/38/39	**83**	242' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	36/37/39	**84**	114' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 39	**85**	106' **Boot** (4' x 4')
9 / 09	AG	MX - 0	9 / 10	JS	P	39/41	**86**	25' **DS - 20** (2' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 41	**87**	77' **Boot** (4' x 4')
9 / 09	AG	MX - 0	9 / 10	JS	P	39/40/41	**88**	150' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	Panel 39	**89**	170' **Boot** (4' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	Panel 39	**90**	198' **Boot** (4' x 4')

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 09	CS	MX - 08	9 / 10	JS	P	38/39/40	**91**	246' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 10	JS	P	38/40	**92**	277' **Boot** (4' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	40/42/43	**93**	314' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	40/41/42	**94**	162' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	42/44/45	**95**	22' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 44	**96**	90' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 42	**97**	148' **Boot** (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	42/44	**98**	210' **Boot** (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	Panel 42	**99**	258' **Boot** (4' x 4')
9 / 09	CS	MX - 08	9 / 10	JS	P	42/43/44	**100**	330' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 09	JS	P	43/44	**101**	335' **DS - 21** (2' x 4')
9 / 09	CS	MX - 08	9 / 09	JS	P	Panel 44	**102**	395' **Boot** (Cleanout) (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	Panel 44	**103**	315' **Boot** (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	44/46	**104**	242' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 46	**105**	180' **Boot** (4' x 4')

Q.C. Initials: E.D.R

MID - AMERICA LINING CO.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 09	AG	MX - 0	9 / 10	JS	P	44/46	**106**	155' **DS - 22** (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 46	**107**	118' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	44/45/46	**108**	30' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	46/48	**109**	108' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 46	**110**	167' **Boot** (4' x 4')
9 / 09	AG	MX - 0	9 / 10	JS	P	46/48	**111**	175' **DS - 23** (2' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 48	**112**	217' **Boot** (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	Panel 46	**113**	264' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 48	**114**	317' **Boot** (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	46/47/48	**115**	354' "T" (2' x 2')
9 / 10	CS	MX - 08	9 / 10	JS	P	47/48/50	**116**	354' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	48/50	**117**	315' **DS - 24** (2' x 4')
9 / 09	AG	MX - 0	9 / 10	JS	P	48/49/50	**118**	136' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 49	**119**	136' **Boot** (4' x 4')
9 / 09	AG	MX - 0	9 / 10	JS	P	49/50/52	**120**	136' "T" (2' x 2')

Q.C. Initials: E.D.R.

MID - AMERICA LINING Co.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 09	AG	MX - 0	9 / 10	JS	P	50/51/52	**121**	152' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 51	**122**	181' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 51	**123**	234' **Boot** (4' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 50	**124**	288' **Boot** (4' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	51/53/54	**125**	336' "T" (2' x 2')
9 / 09	CS	MX - 08	9 / 10	JS	P	Panel 53	**126**	320' **Boot (Manhole)** (8' x 8')
9 / 10	AG	MX - 0	9 / 10	JS	P	51/52/53	**127**	138' "T" (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	52/53	**128**	30' **DS - 25** (2' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	53/55	**129**	130' **DS - 26** (2' x 4')
9 / 10	CS	MX - 08	9 / 10	JS	P	53/54/55	**130**	286' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	55/56/57	**131**	56' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	56/57/58	**132**	14' "T" (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	56/58	**133**	50' **DS - 27** (2' x 4')
9 / 10	AG	MX - 0	9 / 10	JS	P	58/59	**134**	30' **DS - 28** (2' x 4')
9 / 09	AG	MX - 0	9 / 09	JS	P	R 50/P 24	**135**	**Extrusion DS - 29** (2' x 4')

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID - AMERICA LINING CO.

REPAIR LOG

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: 60 Mil H.D.P.E. Smooth

Weld Data			Vacuum Test Data					
Date	**Welder Initials**	**Machine Number**	**Date**	**Tester Initials**	**Result (P / F)**	**Seam Number**	**Repair Number**	**Locations / Comments**
9 / 09	AG	MX - 0	9 / 10	JS	P	R 76/P 35	**138**	**Extrusion DS - 30** (2' x 4')
9 / 09	AG	MX - 0	9 / 10	JS	P	39/41	**137**	115' (2' x 2')
9 / 09	AG	MX - 0	9 / 10	JS	P	41/42	**138**	6' Anchor Trench (2' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 61	**139**	6' Anchor Trench - Fiber Optic **Boot** (3' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	59/60	**140**	6' Anchor Trench (2' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	53/55	**141**	8' (2' x 2')
9 / 10	AG	MX - 0	9 / 10	JS	P	53/55	**142**	6' Anchor Trench (2' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	46/48	**143**	6' Anchor Trench (2' x 3')
9 / 09	AG	MX - 0	9 / 10	JS	P	35/36	**144**	6' Anchor Trench (2' x 3')
9 / 09	CS	MX - 08	9 / 09	JS	P	18/20	**145**	6' Anchor Trench (2' x 3')
9 / 09	CS	MX - 08	9 / 09	JS	P	16/17	**146**	6' Anchor Trench (2' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 53	**147**	4' Anchor Trench - EW 20C Power **Boot** (3' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	55/56	**148**	220' Anchor Trench (2' x 3')
9 / 10	AG	MX - 0	9 / 10	JS	P	Panel 61	**149**	25' (2' x 2')
9 / 10	CS	MX - 08	9 / 10	JS	P	R 50/P 24	**150**	**DS - 29 Cap** (2' x 20')

12/00 - E.D.R.

Q.C. Initials: E.D.R.

- **Trial Weld Log**

MID-AMERICA LINING CO.

TRIAL WELD LOG

Page: 1 **of:** 2

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: **60 Mil L.L.D.P.E.**

				Extrusion Welds		*Fusion Welds*								
Date / Time	**Ambient Temp.**	**Seamer Initials**	**Machine Number**	**Barrel Temp.**	**Preheat Temp.**	**Wedge Temp.**	**Speed Setting**	**Peel Values Lbs. / Inch**			**Shear Values Lbs. / Inch**			**(P / F)**
9 / 05	70	MS	C - 1	N / A	N / A	750	4.5	102/106	116/119	106/109	136	142	126	P
08.00h								111/114	107/112		133	118		
9 / 05	70	MSO	C - 4	N / A	N / A	750	4.5	103/116	108/110	100/106	132	135	128	P
08.00h								111/114	114/114		132	131		
9 / 05	85	MS	C - 1	N / A	N / A	750	4.5	86/86	88/99	90/97	102	97	99	P
12.40h								95/97	102/102		93	105		
9 / 05	85	MSO	C - 4	N / A	N / A	750	5.0	88/91	97/93	90/93	93	86	87	P
12.45h								91/94	86/99		90	95		
9 / 06	65	MS	C - 1	N / A	N / A	750	4.5	107/118	103/111	100/103	102	138	131	P
07.40h								100/104	100/108		129	129		
9 / 06	65	MSO	C - 4	N / A	N / A	750	4.5	99/104	106/111	103/111	129	132	128	P
07.42h								105/116	102/106		126	130		
9 / 06	65	AG	MX - 0	300	270	N / A	N / A	97	107	106	108	110	115	P
07.40h								105	114		124	130		
9 / 06	85	MS	C - 1	N / A	N / A	750	4.5	89/94	89/99	89/98	93	97	97	P
12.55h								90/91	87/89		98	99		
9 / 06	85	MSO	C - 4	N / A	N / A	750	4.5	82/88	85/90	88/92	98	99	98	P
12.47h								90/91	87/89		94	99		
9 / 06	85	AG	MX - 0	300	270	N / A	N / A	86	84	104	107	113	107	P
12.40h								94	110		109	111		
9 / 07	75	MS	C - 1	N / A	N / A	750	4.5	111/114	105/109	113/119	129	131	1223	P
07.40h								114/115		115/115	134	134		
9 / 07	75	MSO	C - 4	N / A	N / A	750	4.5	106/123	114/117	111/122	126	131	138	P
07.45h								118/126	112/125		129	131		
9 / 07	75	AG	MX - 0	300	270	N / A	N / A	101	104	108	132	135	131	P
07.50h								101	108		134	140		
9 / 07	75	MSO	C - 4	N / A	N / A	750	4.5	84/103	91/91	99/104	97	101	101	P
09.45h								96/103	94/102		107	108		
9 / 07	90	MS	C - 1	N / A	N / A	750	4.5	101/102	90/100	94/107	96	98	100	P
12.50h								99/99	100/104		105	107		

12/00 - E.D.R.

Q.C. Initials: E.D.R.

MID-AMERICA LINING CO.

TRIAL WELD LOG

Page: 2 **of:** 2

Project Name: **American Chemical** Project Location: Griffith, IN Material Description: **60 Mil L.L.D.P.E.**

				Extrusion Welds		*Fusion Welds*								
Date / Time	**Ambient Temp.**	**Seamer Initials**	**Machine Number**	**Barrel Temp.**	**Preheat Temp.**	**Wedge Temp.**	**Speed Setting**	**Peel Values Lbs. / Inch**			**Shear Values Lbs. / Inch**			**(P / F)**
9 / 07	90	MSO	C - 4	N / A	N / A	750	4.5	99/100	97/99	106/107	107	109	112	P
12.55h								103/104	106/112		104	105		
9 / 07	90	MSO	MX - 0	300	220	N / A	N / A	111	111	112	108	109	111	P
13.00h								100	114		117	119		
9 / 09	80	AG	MX - 0	300	260	N / A	N / A	99	99	100	115	117	119	P
07.30h								100	102		120	121		
9 / 09	80	CS	MX - 08	270	275	N / A	N / A	100	102	103	117	118	112	P
07.40h								101	105		119	120		
9 / 09	100	AG	MX - 0	300	260	N / A	N / A	85	89	88	105	105	106	P
12.20h								87	91		104	107		
9 / 09	100	CS	MX - 08	270	215	N / A	N / A	85	86	87	99	100	101	P
12.30h								88	89		103	104		
9 / 10	75	CS	MX - 08	270	215	N / A	N / A	115	122	111	134	138	132	P
07.25h								114	128		133	135		
9 / 10	75	AG	MX - 0	300	260	N / A	N / A	100	105	89	107	115	107	P
07.25h								96	98		120	127		
9 / 10	95	AG	MX - 0	300	260	N / A	N / A	89	87	91	92	92	93	P
12.15h								90	92		94	95		
9 / 10	95	CS	MX - 08	270	215	N / A	N / A	85	83	87	90	91	95	P
12.09h								84	86		91	92		

12/00 - E.D.R.

Q.C. Initials: E.D.R.

- **Quality Control (QC) Daily Field Report**

MID - AMERICA LINING CO.

QC Daily Field Report

Date: 9 / 4 / 02

Day #: 1

QC ID: E.D.R.

Project Name: American Chemical Services
Project Number: N/A
Client: E.C.I.
Location: Griffith, IN
Ambient Temperature Range: 70 To 85

			Installed Today	Installed To Date:
Sq. Ft. 60 Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0
Sq. Ft. N/A Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	N/A	N/A	N/A
Linear Feet Seamed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0
Linear Feet Reconstructed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0

Percentage Detailed Today	0	%	Total To Date	0 %
Percentage Air-Tested Today	0	%	Total To Date	0 %
Percentage V-Boxed Today	0	%	Total To Date	0 %

	Type	Installed Today	Installed To Date
PVC	N/A	N/A	N/A
Geonet	N/A	N/A	N/A
Geocomposite	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 150'	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 230'	N/A	N/A	N/A

Failure Rate = $\frac{\textbf{Initial Failures}}{\textbf{Initial Samples}} \times 100$

	# Today	% Today	# To Date	%To Date
Initial Destruct Samples	0		0	
Initial Destruct Failures	0	0	0	0
Tracked Destructive Samples	0		0	

Comments: Set - Up

QC Print Name: Robertson, Eric, D. Signature [signature] Date: 9 / 4 / 02

MID - AMERICA LINING CO.

QC Daily Field Report

Date: 9 / 5 / 02

Day #: 2

QC ID: E.D.R.

Project Name: American Chemical Services
Project Number: N/A
Client: E.C.I.
Location: Griffith, IN
Ambient Temperature Range: 70 To 85

			Installed Today	Installed To Date:
Sq. Ft. 60 Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	96,660	96,660
Sq. Ft. N/A Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	N/A	N/A	N/A
Linear Feet Seamed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	4,021	4021
Linear Feet Reconstructed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0

Percentage Detailed Today	0	%	Total To Date	0 %
Percentage Air-Tested Today	100	%	Total To Date	100 %
Percentage V-Boxed Today	0	%	Total To Date	0 %

	Type	Installed Today	Installed To Date
PVC	N/A	N/A	N/A
Geonet	N/A	N/A	N/A
Geocomposite	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 150'	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 230'	N/A	N/A	N/A

Failure Rate = $\frac{\textbf{Initial Failures}}{\textbf{Initial Samples}} \times 100$

	# Today	% Today	# To Date	%To Date
Initial Destruct Samples	8		8	
Initial Destruct Failures	0	0	0	0
Tracked Destructive Samples	0		0	

Comments: Deployed Around Several Boots

QC Print Name: Robertson, Eric, D. Signature [signature] Date: 9 / 5 / 02

MID-AMERICA LINING CO.

QC Daily Field Report

Date: 9/6/02
Day #: 3
QC ID: E.D.R.

Project Name: American Chemical Services
Project Number: N/A
Client: E.C.I.
Location: Griffith, IN
Ambient Temperature Range: 70 To 85

			Installed Today	Installed To Date:
Sq. Ft. 60 Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	93,645	190,305
Sq. Ft. N/A Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	N/A	N/A	N/A
Linear Feet Seamed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	4,546	8,567
Linear Feet Reconstructed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0

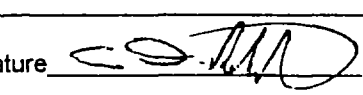
Percentage Detailed Today	40 %	Total To Date	0 %
Percentage Air-Tested Today	100 %	Total To Date	100 %
Percentage V-Boxed Today	0 %	Total To Date	0 %

	Type	Installed Today	Installed To Date
PVC	N/A	N/A	N/A
Geonet	N/A	N/A	N/A
Geocomposite	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 150'	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 230'	N/A	N/A	N/A

Failure Rate = $\frac{\textbf{Initial Failures}}{\textbf{Initial Samples}} \times 100$

	# Today	% Today	# To Date	%To Date
Initial Destruct Samples	10		18	
Initial Destruct Failures	0	0	0	0
Tracked Destructive Samples	0		0	

Comments: Deployed Around Several Boots & Structures

QC Print Name: Robertson, Eric, D. Signature  Date: 9/6/02

MID-AMERICA LINING CO.

QC Daily Field Report

Date: 9/7/02

Day #: 4

QC ID: E.D.R.

Project Name: American Chemical Services
Project Number: N/A
Client: E.C.I.
Location: Griffith, IN
Ambient Temperature Range: 70 To 90

			Installed Today	Installed To Date:
Sq. Ft. 60 Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	85,647	275,952
Sq. Ft. N/A Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	N/A	N/A	N/A
Linear Feet Seamed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	4,705	13,272
Linear Feet Reconstructed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0

Percentage Detailed Today	20 %	Total To Date	50 %	
Percentage Air-Tested Today	100 %	Total To Date	100 %	
Percentage V-Boxed Today	0 %	Total To Date	0 %	

	Type	Installed Today	Installed To Date
PVC	N/A	N/A	N/A
Geonet	N/A	N/A	N/A
Geocomposite	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 150'	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 230'	N/A	N/A	N/A

Failure Rate = $\frac{\textbf{Initial Failures}}{\textbf{Initial Samples}}$ **X 100**

	# Today	% Today	# To Date	%To Date
Initial Destruct Samples	12		30	
Initial Destruct Failures	0	0	0	0
Tracked Destructive Samples	0		0	

Comments: Deployed Around Several Boots & Structures

QC Print Name: Robertson, Eric, D. Signature [signature] Date: 9/7/02

MID - AMERICA LINING CO.

QC Daily Field Report

Date: 9 / 9 / 02

Day #: 5

QC ID: E.D.R.

Project Name: American Chemical Services
Project Number: N/A
Client: E.C.I.
Location: Griffith, IN
Ambient Temperature Range: 70 To 100

			Installed Today	Installed To Date:
Sq. Ft. 60 Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	275,952
Sq. Ft. N/A Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	N/A	N/A	N/A
Linear Feet Seamed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	13,272
Linear Feet Reconstructed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0

Percentage Detailed Today	25	%	Total To Date	75 %
Percentage Air-Tested Today	0	%	Total To Date	100 %
Percentage V-Boxed Today	50	%	Total To Date	50 %

	Type	Installed Today	Installed To Date
PVC	N/A	N/A	N/A
Geonet	N/A	N/A	N/A
Geocomposite	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 150'	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 230'	N/A	N/A	N/A

Failure Rate = $\frac{\textbf{Initial Failures}}{\textbf{Initial Samples}} \times 100$

	# Today	% Today	# To Date	%To Date
Initial Destruct Samples	0		30	
Initial Destruct Failures	0	0	0	0
Tracked Destructive Samples	0		0	

Comments: Detailed & V-Boxed

QC Print Name: Robertson, Eric, D. Signature [signature] Date: 9 / 9 / 02

MID - AMERICA LINING CO.

QC Daily Field Report

Date: 9 / 10 / 02

Day #: 6

QC ID: E.D.R.

Project Name: American Chemical Services
Project Number: N/A
Client: E.C.I.
Location: Griffith, IN
Ambient Temperature Range: 70 To 100

			Installed Today	Installed To Date:
Sq. Ft. 60 Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	275,952
Sq. Ft. N/A Mil Liner		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	N/A	N/A	N/A
Linear Feet Seamed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	13,272
Linear Feet Reconstructed:		Primary	N/A	N/A
		Secondary	N/A	N/A
		Textured	N/A	N/A
	Other:	Smooth	0	0

Percentage Detailed Today	25 %	Total To Date	100 %
Percentage Air-Tested Today	0 %	Total To Date	100 %
Percentage V-Boxed Today	50 %	Total To Date	100 %

	Type	Installed Today	Installed To Date
PVC	N/A	N/A	N/A
Geonet	N/A	N/A	N/A
Geocomposite	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 150'	N/A	N/A	N/A
Geo-Synthetic Clay Liner (GCL) 230'	N/A	N/A	N/A

Failure Rate = $\frac{\textbf{Initial Failures}}{\textbf{Initial Samples}} \times \textbf{100}$

	# Today	% Today	# To Date	%To Date
Initial Destruct Samples	0		30	
Initial Destruct Failures	0	0	0	0
Tracked Destructive Samples	0		0	

Comments: Detailed & V-Boxed

QC Print Name: Robertson, Eric, D. Signature [signature] Date: 9 / 10 / 02

- **Certificate of Acceptance for Installed FML**

MID-AMERICA LINING LLC

Acceptance For Work As Completed

Date: Sept. 11, 2002 Type: ☐ Partial ☐ Substantial ☒ Final

Project Name: American Chemical Service **Project Location:** Griffith, IN

Billing Information:
Owners Representative: E.C.I. / MWH

Owner:

Description Of Lined Area: Panels 1 - 61

Material Type: 60 Mil L.L.D.P.E. Smooth Total ℄: **275,952**

Material Type: Total ℄:

Material Type: Total ℄:

Material Type: Total ℄:

The undersigned, as owner or authorized representative for the owner, states that he has inspected the above described project and has found it completed in accordance with plans and specifications of the project.

Comments: 3 Manholes - 2 Perforated Cleanouts - 1 Fiberoptic Boot
1 EW 20 C Power Conduit Boot - 48 Evaporation Extraction Boots
1 - Power Conduit @ Pump House - 1 Power Supply @ Manhole Boot

MAL Representative: Robertson, Eric, D. Title: Field QC

Signature:

Owner / Representative: Palmer, Stve Title: Site Superintendent

Signature:

CQA Engineer: Title:

Signature:

APPENDIX G

Chemical Analytical Testing of Borrow Source Material (First Environmental)

- **Merrillville Source Sample**

- **Merrillville Source Sample**

OCT 04 2002

MEMORANDUM

MWH
MONTGOMERY WATSON HARZA

27755 Diehl Road, Suite 300
Warrenville, IL 60555
Tel: (630)836-8900
Fax: (630)836-8959

To: Daryl Streed **Date:** September 30, 2002

From: Jon Pohl

Subject: Off Site Root Zone Material Acceptance

Upon review of the ECI Off-Site Root Zone Material submittals and the ECI Imported Soil Certification Letter (dated September 9, 2002), the material is acceptable for use as the root zone material for the Final Cover in the Off-Site Area of the ACS NPL Site. The only issues of note on this material are as follows:

1. The arsenic result (6.8 mg/kg) exceeds the U.S. EPA Region IX screening criteria of 2.7 mg/kg. However, this arsenic result is within the regional background concentration range (1.1 to 24 mg/kg) established by a 1994 IEPA study.

2. The reporting limits for several semi-volatile compounds (noted on Table 1) exceed either the Region IX PRG or the IDEM RISC Default screening value. This is due to the fact that the instrumentation at the laboratory used could not achieve these levels. However, the results for these compounds are "non-detect" at the instrument detection limit, so that the material is found to be acceptable.

Attachments

Cc: Todd Lewis, MWH
Rob Adams, MWH

J:\209\0601 ACS\0119 Final Off-SiteCover\Off Site Matl Accept.doc

Environmental Contractors of Illinois, Inc.

September 9, 2002

Todd Lewis
MWH Americas, Inc.
27755 Diehl Rd, Suite 300
Warrenville, IL 60555

RE: Imported Soil Certification
Off-Site Containment Area Engineered Cover
American Chemical Service, Inc. (ACS)
National Priority List (NPL) Site
420 South Colfax Avenue, Griffith, Indiana

Dear Mr. Lewis:

This letter will serve as certification that all imported material will meet MWH's specifications. If you have any questions please contact me.

Sincerely,

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.

Daryl L. Streed
Vice President

DLS:lw

E ronmental
n...ediation
contracting
& filling

5 O Nimtz
F d
Loves Park
Illinois 61111

PO. Box 2071
es Park
...ois 61130

...3.654.4726
Fax 815.654.4736

First Environmental Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

July 26, 2002

Mr. Randy Price
ENVIRONMENTAL CONTRACTORS OF ILLINOIS
5290 Nimtz Road
Loves Park, IL 61111

Project ID: ACS Superfund Site
First Environmental File ID: 63491-92
Date Received: July 19, 2002

Dear Mr. Price:

The above referenced samples were analyzed as directed on the enclosed chain of custody record.

All analyses were performed in accordance with methods from the USEPA publication, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, December, 1996. The specific method references are listed on the Analytical Report.

Results have been expressed on a dry weight basis per method protocol.

All analyses were performed within established holding times, and all Quality Control criteria as outlined in the methods have been met. QA/QC documentation and raw data will remain on file for future reference.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at 630-778-1200.

Sincerely,

W. Zaworski for

Stan Zaworski
Project Manager

202
2686

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	07/26/02

Analyte	Result	Units	Date Analyzed	Method
Cyanide	<0.10	mg/kg	07/26/02	9010B/9014
Aluminum	14,500	mg/kg	07/26/02	3050B/6010B
Antimony	<1.0	mg/kg	07/26/02	3050B/6010B
Arsenic	6.8	mg/kg	07/26/02	3050B/6010B
Barium	104	mg/kg	07/26/02	3050B/6010B
Beryllium	0.6	mg/kg	07/26/02	3050B/6010B
Cadmium	<0.1	mg/kg	07/26/02	3050B/6010B
Calcium	5,220	mg/kg	07/26/02	3050B/6010B
Chromium	20.1	mg/kg	07/26/02	3050B/6010B
Cobalt	9.1	mg/kg	07/26/02	3050B/6010B
Copper	13.4	mg/kg	07/26/02	3050B/6010B
Iron	21,000	mg/kg	07/26/02	3050B/6010B
Lead	21.1	mg/kg	07/26/02	3050B/6010B
Magnesium	4,540	mg/kg	07/26/02	3050B/6010B
Manganese	464	mg/kg	07/26/02	3050B/6010B
Mercury	<0.05	mg/kg	07/24/02	7470A
Nickel	19.1	mg/kg	07/26/02	3050B/6010B
Potassium	1,910	mg/kg	07/26/02	3050B/6010B
Selenium	1.0	mg/kg	07/26/02	3050B/6010B
Silver	<0.1	mg/kg	07/26/02	3050B/6010B
Sodium	168	mg/kg	07/26/02	3050B/6010B
Thallium	<1.0	mg/kg	07/26/02	3050B/6010B
Vanadium	25.8	mg/kg	07/26/02	3050B/6010B
Zinc	63.2	mg/kg	07/26/02	3050B/6010B

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Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	07/26/02

Analyte	Result	Units	Flags
Solids, Total	97.63	%	
Volatile Organic Compounds Method 8260B			
Analysis Date: 07/25/02			
Acetone	< 10.0	ug/kg	
Benzene	< 5.0	ug/kg	
Bromodichloromethane	< 5.0	ug/kg	
Bromoform	< 5.0	ug/kg	
Bromomethane	< 10.0	ug/kg	
2-Butanone	< 10.0	ug/kg	
Carbon disulfide	< 5.0	ug/kg	
Carbon tetrachloride	< 5.0	ug/kg	
Chlorobenzene	< 5.0	ug/kg	
Chlorodibromomethane	< 5.0	ug/kg	
Chloroethane	< 10.0	ug/kg	
Chloroform	< 5.0	ug/kg	
Chloromethane	< 10.0	ug/kg	
1,1-Dichloroethane	< 5.0	ug/kg	
1,2-Dichloroethane	< 5.0	ug/kg	
1,1-Dichloroethene	< 5.0	ug/kg	
cis-1,2-Dichloroethene	< 5.0	ug/kg	
trans-1,2-Dichloroethene	< 5.0	ug/kg	
1,2-Dichloropropane	< 5.0	ug/kg	
cis-1,3-Dichloropropene	< 5.0	ug/kg	
trans-1,3-Dichloropropene	< 5.0	ug/kg	
Ethyl benzene	< 5.0	ug/kg	
2-Hexanone	< 10.0	ug/kg	
4-Methyl-2-pentanone	< 10.0	ug/kg	
Methylene chloride	< 5.0	ug/kg	
Styrene	< 5.0	ug/kg	
1,1,2,2-Tetrachloroethane	< 5.0	ug/kg	
Tetrachloroethene	< 5.0	ug/kg	
Toluene	< 5.0	ug/kg	
1,1,1-Trichloroethane	< 5.0	ug/kg	
1,1,2-Trichloroethane	< 5.0	ug/kg	
Trichloroethene	< 5.0	ug/kg	
Vinyl Acetate	< 10.0	ug/kg	
Vinyl Chloride	< 10.0	ug/kg	
Xylenes (total)	< 5.0	ug/kg	

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Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	07/26/02

Analyte	Result	Units	Flags
Base-Neutral/Acid Compounds Method 3540C/8270C			
Preparation Date: 07/24/02			
Analysis Date: 07/25/02			
Acenaphthene	< 330	ug/kg	
Acenaphthylene	< 330	ug/kg	
Anthracene	< 330	ug/kg	
Benzidine	< 330	ug/kg	
Benzo[a]anthracene	< 330	ug/kg	
Benzo[b]fluoranthene	< 330	ug/kg	
Benzo[k]fluoranthene	< 330	ug/kg	
Benzo[g,h,i]perylene	< 330	ug/kg	
Benzo[a]pyrene	< 90	ug/kg	
Benzoic Acid	< 330	ug/kg	
Benzyl alcohol	< 330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	ug/kg	
bis(2-Chloroethyl)ether	< 330	ug/kg	
bis(2-chloroisopropyl)ether	< 330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	ug/kg	
4-Bromophenyl-phenylether	< 330	ug/kg	
Butylbenzylphthalate	< 330	ug/kg	
Carbazole	< 330	ug/kg	
4-Chloroaniline	< 330	ug/kg	
4-Chloro-3-methylphenol	< 330	ug/kg	
2-Chloronaphthalene	< 330	ug/kg	
2-Chlorophenol	< 330	ug/kg	
4-Chlorophenyl-phenylether	< 330	ug/kg	
Chrysene	< 330	ug/kg	
Dibenz[a,h]anthracene	< 90	ug/kg	
Dibenzofuran	< 330	ug/kg	
1,2-Dichlorobenzene	< 330	ug/kg	
1,3-Dichlorobenzene	< 330	ug/kg	
1,4-Dichlorobenzene	< 330	ug/kg	
3,3'-Dichlorobenzidine	< 660	ug/kg	
2,4-Dichlorophenol	< 330	ug/kg	
Diethylphthalate	< 330	ug/kg	

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Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	07/26/02

Analyte	Result	Units	Flags
2,4-Dimethylphenol	< 330	ug/kg	
Dimethylphthalate	< 330	ug/kg	
Di-n-butylphthalate	< 330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	ug/kg	
2,4-Dinitrophenol	< 1,600	ug/kg	
2,4-Dinitrotoluene	< 250	ug/kg	
2,6-Dinitrotoluene	< 260	ug/kg	
Di-n-octylphthalate	< 330	ug/kg	
Fluoranthene	< 330	ug/kg	
Fluorene	< 330	ug/kg	
Hexachlorobenzene	< 330	ug/kg	
Hexachlorobutadiene	< 330	ug/kg	
Hexachlorocyclopentadiene	< 330	ug/kg	
Hexachloroethane	< 330	ug/kg	
Indeno[1,2,3-cd]pyrene	< 330	ug/kg	
Isophorone	< 330	ug/kg	
2-Methylnaphthalene	< 330	ug/kg	
2-Methylphenol	< 330	ug/kg	
3&4-Methylphenol	< 330	ug/kg	
Naphthalene	< 330	ug/kg	
2-Nitroaniline	< 1,600	ug/kg	
3-Nitroaniline	< 1,600	ug/kg	
4-Nitroaniline	< 1,600	ug/kg	
Nitrobenzene	< 260	ug/kg	
2-Nitrophenol	< 1,600	ug/kg	
4-Nitrophenol	< 1,600	ug/kg	
N-Nitrosodimethylamine	< 330	ug/kg	
N-Nitroso-di-n-propylamine	< 330	ug/kg	
n-Nitrosodiphenylamine	< 330	ug/kg	
Pentachlorophenol	< 330	ug/kg	
Phenanthrene	< 330	ug/kg	
Phenol	< 330	ug/kg	
Pyrene	< 330	ug/kg	
1,2,4-Trichlorobenzene	< 330	ug/kg	
2,4,5-Trichlorophenol	< 660	ug/kg	
2,4,6-Trichlorophenol	< 330	ug/kg	

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Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	07/26/02

Analyte	Result	Units	Flags
Pesticides/PCBs Method 3540C/8081A/8082			
Preparation Date: 07/24/02			
Date Analyzed: 07/26/02			
Aldrin	< 8.0	ug/kg	
Aroclor 1016	< 80.0	ug/kg	
Aroclor 1221	< 80.0	ug/kg	
Aroclor 1232	< 80.0	ug/kg	
Aroclor 1242	< 80.0	ug/kg	
Aroclor 1248	< 80.0	ug/kg	
Aroclor 1254	< 160	ug/kg	
Aroclor 1260	< 160	ug/kg	
alpha-BHC	< 2.0	ug/kg	
beta-BHC	< 8.0	ug/kg	
delta-BHC	< 8.0	ug/kg	
Lindane (gamma-BHC)	< 8.0	ug/kg	
alpha-Chlordane	< 80.0	ug/kg	
gamma-Chlordane	< 80.0	ug/kg	
4,4'-DDD	< 16.0	ug/kg	
4,4'-DDE	< 16.0	ug/kg	
4,4-DDT	< 16.0	ug/kg	
Dieldrin	< 16.0	ug/kg	
Endosulfan I	< 8.0	ug/kg	
Endosulfan II	< 16.0	ug/kg	
Endosulfan sulfate	< 16.0	ug/kg	
Endrin	< 16.0	ug/kg	
Endrin aldehyde	< 16.0	ug/kg	
Endrin ketone	< 16.0	ug/kg	
Heptachlor	< 8.0	ug/kg	
Heptachlor epoxide	< 8.0	ug/kg	
Methoxychlor	< 80.0	ug/kg	
Toxaphene	< 160	ug/kg	

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Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63492	Date Taken:	07/19/02
Sample Description:	V & H Soil	Time Taken:	8:30
Lab File ID:	63491-92	Date Reported:	07/26/02

Analyte	Result	Units	Flags
Solids, Total	81.91	%	
BTEX Method 5035/8260B			
Analysis Date: 07/25/02			
Benzene	< 2.0	ug/kg	
Toluene	< 5.0	ug/kg	
Ethyl benzene	< 5.0	ug/kg	
Xylenes (total)	< 5.0	ug/kg	
Polynuclear Aromatic Compounds Method 3540C/8270C			
Preparation Date: 07/24/02			
Analysis Date: 07/25/02			
Naphthalene	< 25	ug/kg	
Acenaphthylene	< 50	ug/kg	
Acenaphthene	< 50	ug/kg	
Fluorene	< 50	ug/kg	
Phenanthrene	< 50	ug/kg	
Anthracene	< 50	ug/kg	
Fluoranthene	97	ug/kg	
Pyrene	96	ug/kg	
Benzo[a]anthracene	59	ug/kg	
Chrysene	59	ug/kg	
Benzo[b]fluoranthene	83	ug/kg	
Benzo[k]fluoranthene	39	ug/kg	
Benzo[a]pyrene	77	ug/kg	
Indeno[1,2,3-cd]pyrene	48	ug/kg	
Dibenz[a,h]anthracene	< 20	ug/kg	
Benzo[g,h,i]perylene	< 50	ug/kg	

CHAIN OF CUSTODY RECORD

First Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
24 Hr. Pager (708) 569-7507
E-mail: info@firstenv.com
IEPA Certification# 100292

Company Name: ENVIRONMENTAL CONTRACTORS OF ILLINOIS INC.
Street Address: 5290 NIMTZ ROAD
City: LAKES PARK State: IL Zip: 61111
Phone: 815. 654. 4726 Fax: 815. 636. 4504
Send Report To: RANDY PRICE
Sampled By: RANDY PRICE

Project I.D.: ACS SUPERFUND SITE
P.O. #: 15506

Matrix Codes: S = Soil W = Water O = Other

Date/Time Taken	Sample Description	Matrix	Pesticides / PCB's	SVOC's / VOC's	TCLP Metals	GFAA Metals	Mercury	CN	BTEX & PNA's	TAL (Analyte List)	Comments	Lab I.D.
7-19-02 1pm	U+H YARD Jars	S	X	X	X	X	X	X				103491
7-19-02 8:30am	U+H SOIL #1 Jar + Vial	S						X	X			103492

Cooler Temperature: 4 °C
Received within 6 hrs. of collection: _____

Sb CN
As Pb
Se Th

Notes and Special Instructions: _____

Relinquished By: Linda Weberpals Date/Time 07-19-02 10:15 Received By: _____ Date/Time 7/19/02 1015
Relinquished By: _____ Date/Time _____ Received By: _____ Date/Time _____

Rev. 1/01

First
Environmental
Laboratories, Inc.

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

AUG 3 0 2002

August 27, 2002

Mr. Randy Price
ENVIRONMENTAL CONTRACTORS OF ILLINOIS
5290 Nimtz Road
Loves Park, IL 61111

Project ID: ACS Superfund Site; P.O. #15506
First Environmental File ID: 63491-92
Date Received: July 19th, 2002

Dear Mr. Price:

Enclosed is an amended report for the above referenced samples. A change has been made to the reporting limits for three Base-Neutral/Acid (semi-volatile) compounds. These results have been flagged with an "M". These reporting limits are based on our laboratory's Method Detection Limit (MDL) Study, which is a statistically derived and theoretical value based upon multiple spiked samples. These represent the lowest values that we can report for this sample. One compound, Benzidine, does not meet the EPA Region 9 PRG for industrial soil samples.

All analyses were performed in accordance with methods from the USEPA publication, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, December, 1996.

If future work on this site requires the PRGs to be met, we may consider using alternate methods or seek guidance from Region 9 on methodology.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at 630-778-1200.

Sincerely,

Stan Zaworski
Project Manager

First
Environmental
Laboratories, Inc.
1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233
IEPA Certification #100292

Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	08/27/02

Analyte	Result	Units	Flags
Base-Neutral/Acid Compounds Method 3540C/8270C			
Preparation Date: 07/24/02			
Analysis Date: 07/25/02			
Acenaphthene	< 330	ug/kg	
Acenaphthylene	< 330	ug/kg	
Anthracene	< 330	ug/kg	
Benzidine	< 30	ug/kg	M
Benzo[a]anthracene	< 330	ug/kg	
Benzo[b]fluoranthene	< 330	ug/kg	
Benzo[k]fluoranthene	< 330	ug/kg	
Benzo[g,h,i]perylene	< 330	ug/kg	
Benzo[a]pyrene	< 90	ug/kg	
Benzoic Acid	< 330	ug/kg	
Benzyl alcohol	< 330	ug/kg	
bis(2-Chloroethoxy)methane	< 330	ug/kg	
bis(2-Chloroethyl)ether	< 330	ug/kg	
bis(2-chloroisopropyl)ether	< 330	ug/kg	
bis(2-Ethylhexyl)phthalate	< 330	ug/kg	
4-Bromophenyl-phenylether	< 330	ug/kg	
Butylbenzylphthalate	< 330	ug/kg	
Carbazole	< 330	ug/kg	
4-Chloroaniline	< 330	ug/kg	
4-Chloro-3-methylphenol	< 330	ug/kg	
2-Chloronaphthalene	< 330	ug/kg	
2-Chlorophenol	< 330	ug/kg	
4-Chlorophenyl-phenylether	< 330	ug/kg	
Chrysene	< 330	ug/kg	
Dibenz[a,h]anthracene	< 90	ug/kg	
Dibenzofuran	< 330	ug/kg	
1,2-Dichlorobenzene	< 330	ug/kg	
1,3-Dichlorobenzene	< 330	ug/kg	
1,4-Dichlorobenzene	< 330	ug/kg	
3,3'-Dichlorobenzidine	< 660	ug/kg	
2,4-Dichlorophenol	< 330	ug/kg	
Diethylphthalate	< 330	ug/kg	

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Environmental
Laboratories, Inc.
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IEPA Certification #100292

Analytical Report

Client:	ENVIRONMENTAL CONTRACTORS OF IL, INC.		
Project ID:	ACS Superfund Site; P.O. #15506	Date Received:	07/19/02
Sample Number:	63491	Date Taken:	07/18/02
Sample Description:	V & H Yard	Time Taken:	1 pm
Lab File ID:	63491-92	Date Reported:	08/27/02

Analyte	Result	Units	Flags
2,4-Dimethylphenol	< 330	ug/kg	
Dimethylphthalate	< 330	ug/kg	
Di-n-butylphthalate	< 330	ug/kg	
4,6-Dinitro-2-methylphenol	< 1,600	ug/kg	
2,4-Dinitrophenol	< 1,600	ug/kg	
2,4-Dinitrotoluene	< 250	ug/kg	
2,6-Dinitrotoluene	< 260	ug/kg	
Di-n-octylphthalate	< 330	ug/kg	
Fluoranthene	< 330	ug/kg	
Fluorene	< 330	ug/kg	
Hexachlorobenzene	< 330	ug/kg	
Hexachlorobutadiene	< 330	ug/kg	
Hexachlorocyclopentadiene	< 330	ug/kg	
Hexachloroethane	< 330	ug/kg	
Indeno[1,2,3-cd]pyrene	< 330	ug/kg	
Isophorone	< 330	ug/kg	
2-Methylnaphthalene	< 330	ug/kg	
2-Methylphenol	< 330	ug/kg	
3&4-Methylphenol	< 330	ug/kg	
Naphthalene	< 330	ug/kg	
2-Nitroaniline	< 1,600	ug/kg	
3-Nitroaniline	< 1,600	ug/kg	
4-Nitroaniline	< 1,600	ug/kg	
Nitrobenzene	< 260	ug/kg	
2-Nitrophenol	< 1,600	ug/kg	
4-Nitrophenol	< 1,600	ug/kg	
N-Nitrosodimethylamine	< 45	ug/kg	M
N-Nitroso-di-n-propylamine	< 35	ug/kg	M
n-Nitrosodiphenylamine	< 330	ug/kg	
Pentachlorophenol	< 330	ug/kg	
Phenanthrene	< 330	ug/kg	
Phenol	< 330	ug/kg	
Pyrene	< 330	ug/kg	
1,2,4-Trichlorobenzene	< 330	ug/kg	
2,4,5-Trichlorophenol	< 660	ug/kg	
2,4,6-Trichlorophenol	< 330	ug/kg	

APPENDIX H

Geotechnical Laboratory Testing Results of Root Zone Source Material (K&S Engineers, Inc. [K&S])

SEP 1 0 2002

K&S Engineers, Inc.

9715 KENNEDY AVENUE • HIGHLAND, INDIANA 46322
(219) 924-5231 • (773) 734-5900 • FAX (219) 924-5271

September 11, 2002

File No. 6783

Environmental Contractors of Illinois
5290 Nimtz Road
P. O. Box 2071
Loves Park, IL 61111

Attn: Mr. Randy Price

LABORATORY TEST REPORT
TESTS ON SANDY LEAN CLAY(MERRILLVILLE) AND SAND
AMERICAN CHEMICAL SERVICES
410 S. COLFAX
GRIFFITH, INDIANA

Dear Mr. Price:

At your request, K & S Engineers, Inc. (K & S), has completed the laboratory testing of the samples collected at the above referenced site.

The results of the laboratory tests, which were performed on the samples, are presented below.

Table 1: Laboratory Test Results on Samples for ACS Site

Sample ID	Sample Classification	Moisture Content	Atterberg Limits			Standard Proctor Test results	Specific Gravity	Coefficient of Permeability (cm/sec)	% passing through #200 (ASTM 1140)	Grain-Size curve
			LL	PL	PI					
Sample # 1 (Merrillville)	Dark gray, trace black, Sandy Lean Clay - CL	11.2 %	31	19	12	γ_{dry} = 107.5 pcf Opt. Moist. = 17.5 % (Figure 2)	2.58	1.5×10^{-8} - Sample at 94.7% of Proctor Density	64.3 %	Figure 1
Sample # 2	Grayish brown Fine Sand					γ_{dry} = 109 pcf Opt. Moist. = 11.0 % (Figure 3)				

We appreciate the opportunity to be of service to you. If you have any questions regarding this information, please do not hesitate to call our office.

Very truly yours,
K & S Engineers, Inc.

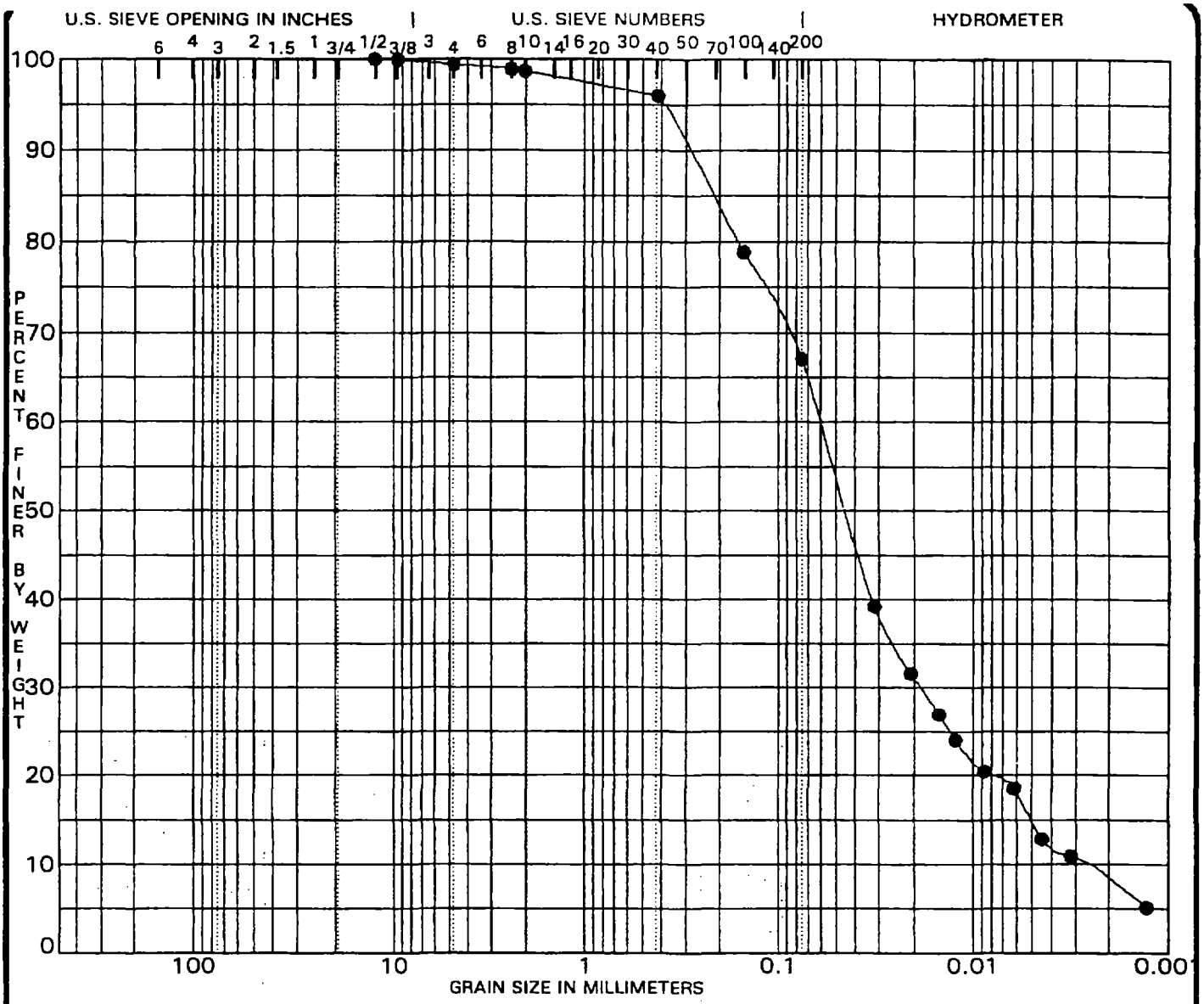
Padmakar Srivastava, Ph.D., P.E.
Project Engineer

Dibakar Sundi, P.E.
Senior Engineer

CA:PS:DS/cam

Attachment(s): Plots for particle-size distribution tests and Standard Proctor test results

K&S



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
●	MERRILL 0.0	SANDY LEAN CLAY CL		31	19	12		

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	MERRILL 0.0	12.50	0.06	0.019	0.0028	0.6	32.4	52.3	14.7

PROJECT ACS - 410 S Colfax, Griffith, IN

JOB NO. 6783

DATE 09/04/02

GRADATION CURVES

K & S TESTING AND ENGINEERING INC.

Figure 1

Figure 2

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland IN 46322 (219) 924-5231

REPORT ON

MOISTURE – DENSITY RELATIONSHIP

CLIENT: Environmental Contractors of Illinois, Inc. (ECI)
5290 Nimtz Road
P.O. Box 2071
Loves Park, IL 61111

PROJECT: ACS
410 S. Colfax
Griffith, Indiana

FILE NO. 6783
DATE 8-31-02
REF. NO. 2

Merriville Source

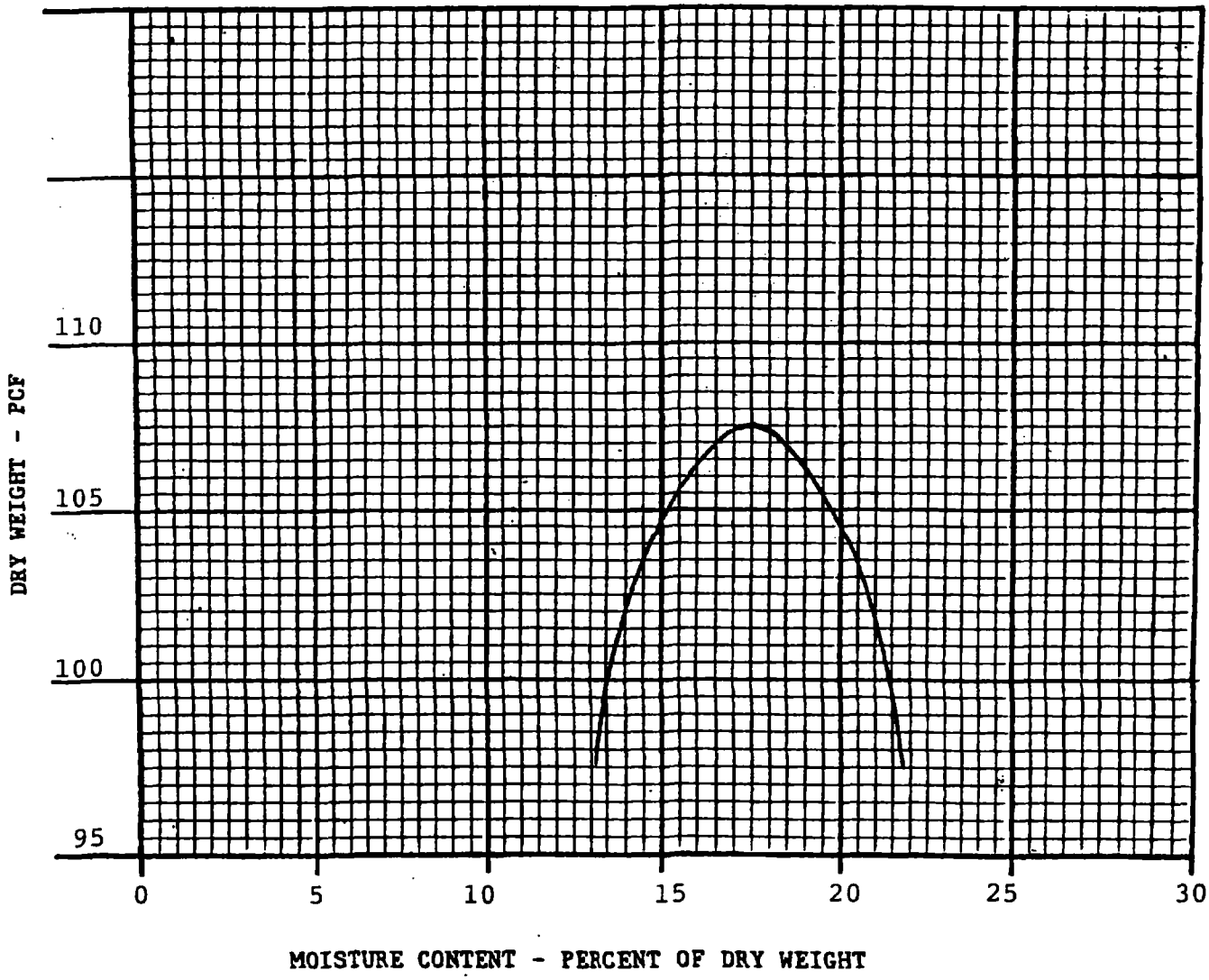
SOURCE OF MATERIAL Borrow

CLASSIFICATION OF MATERIAL Dark gray, trace black sandy lean Clay

METHOD OF COMPACTION Standard Proctor ASTM D 698, Method A

HAMMER WEIGHT 5.5 LBS. FALL 12.0 IN NO. OF LAYERS 3

MOLD SIZE 4.0 INCHES MAX. DENSITY 107.5 PCF OPT. MOISTURE 17.5 %



K & S Engineers, Inc.
9715 Kennedy Avenue - Highland IN 46322 (219) 924-5231

REPORT ON

MOISTURE – DENSITY RELATIONSHIP

CLIENT
Environmental Contractors
of Illinois, Inc. (ECI)
5290 Nimtz Road
P.O. Box 2071
Loves Park, IL 61111

PROJECT
ACS
410 S. Colfax
Griffith, Indiana

FILE NO. 6783
DATE 8-31-02
REF. NO. 1
Wetland Sand Material

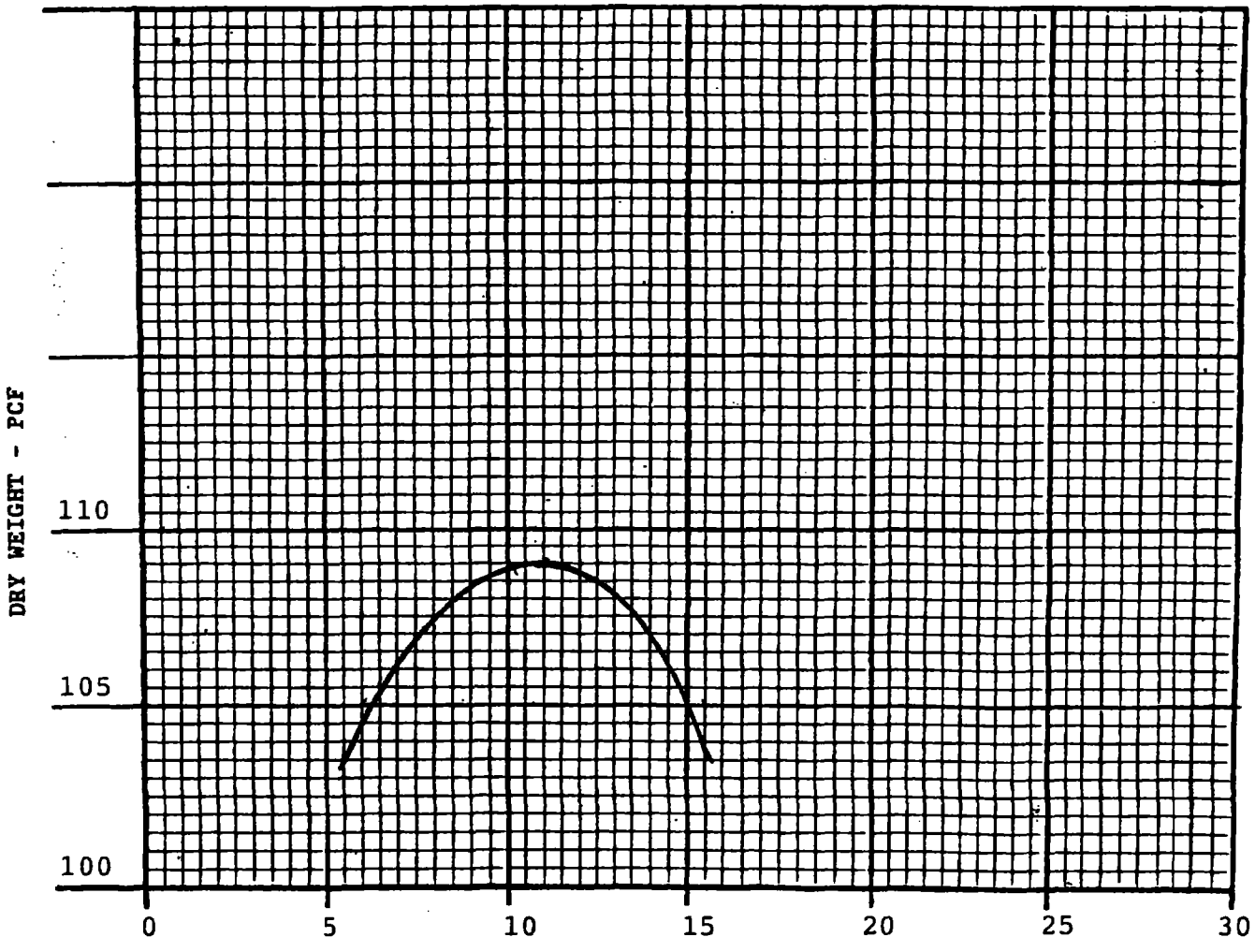
SOURCE OF MATERIAL Borrow

CLASSIFICATION OF MATERIAL Grayish brown fine Sand, trace gravel and silt

METHOD OF COMPACTION Standard Proctor ASTM D 698, Method A

HAMMER WEIGHT 5.5 LBS. FALL 12.0 IN NO. OF LAYERS 3

MOLD SIZE 4.0 INCHES MAX. DENSITY 109.0 PCF OPT. MOISTURE 11.0 %



K&S Engineers, Inc.

9715 KENNEDY AVENUE • HIGHLAND, INDIANA 46322
(219) 924-5231 • (773) 734-5900 • FAX (219) 924-5271

September 30, 2002

File No. 6783-B

Environmental Contractors of Illinois
5290 Nimtz Road
P. O. Box 2071
Loves Park, IL 61111

Attn: Mr. Steve Palmer

LABORATORY TEST REPORT
TESTS ON TOPSOIL
GRIFFITH AND MERRILVILLE SAMPLES
AMERICAN CHEMICAL SERVICES
410 S. COLFAX
GRIFFITH, INDIANA

Dear Mr. Palmer:

At your request, K & S Engineers, Inc. (K & S), has completed the laboratory testing of the topsoil samples from Griffith and Merrillville. The sample from Griffith was furnished by you and the sample from Merrillville was collected at the above referenced site.

The results of the laboratory tests, which were performed on the samples, are presented below.

Table 1: Laboratory Test Results on Samples for ACS Site

Sample ID	Sample Classification	Moisture Content	Atterberg Limits			Standard Proctor Test results	Specific Gravity	Coefficient of Permeability (cm/sec)	% passing through #200 (ASTM 1140)	Grain-Size curve
			LL	PL	PI					
Merrillville (Sample #2)	Dark gray, black Lean Clay with Sand- CL	25.3 %	37	21	16	γ_{dry} = 99 pcf Opt. Moist. = 22.5 % (Ref # 3 - Figure 5)	2.53		76.9 %	Figure 4
Griffth (Sample # 1)	Dark gray, black sandy Clay - CL	19.0%	31	20	11	γ_{dry} = 97 pcf Opt. Moist. = 21.5 % (Ref # 4 - Figure 7)	2.43	7.8×10^{-6} (Compacted at 93.6%)	67.3%	Figure 6
Griffith (Sample # 2)						γ_{dry} = 97.5 pcf Opt. Moist. = 22.0 % (Ref # 5 - Figure 8)				

We appreciate the opportunity to be of service to you. If you have any questions regarding this information, please do not hesitate to call our office at (219) 924- 5231.

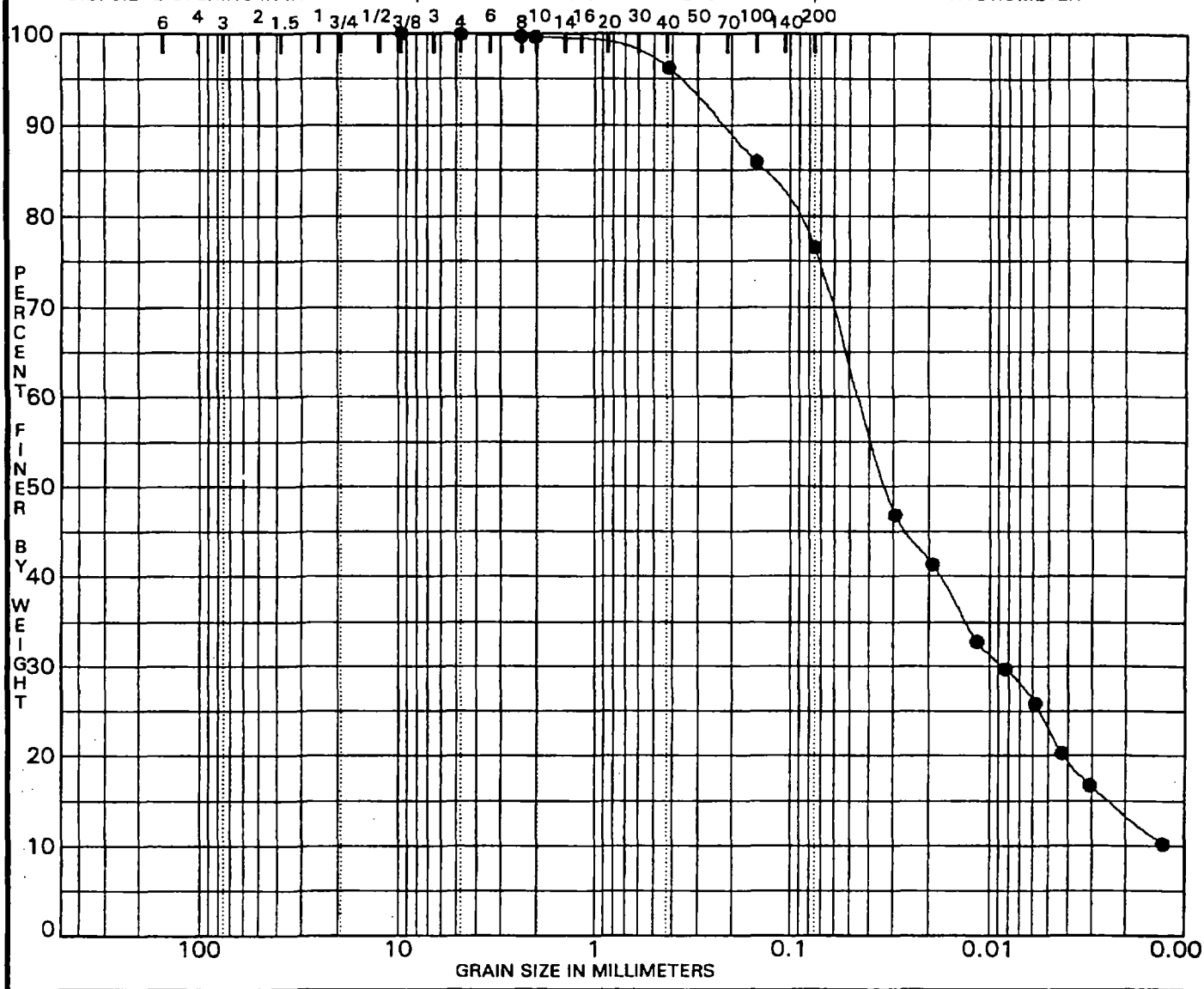
Very truly yours,
K & S Engineers, Inc.

Peter Kostur, LPG
Project Engineer

Dibakar Sundi, P.E.
Project Engineer

CA:PK:DS/cam

Attachment(s): Plots for particle-size distribution tests and Standard Proctor test results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
● MERR-2ND 0.0	LEAN CLAY with SAND CL		37	21	16		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MERR-2ND 0.0	9.50	0.04	0.009		0.1	23.4	53.6	22.9

PROJECT **ACS - 410 S Colfax, Griffith, IN** JOB NO. **6783**
DATE **09/23/02**

GRADATION CURVES

K & S TESTING AND ENGINEERING INC.

Figure 4

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland IN 46322 (219) 924-5231

Figure 5

REPORT ON

MOISTURE – DENSITY RELATIONSHIP

CLIENT: Environmental Contractors of Illinois, Inc. (ECI)
5290 Nimtz Road
P.O. Box 2071
Loves Park, IL 61111

PROJECT: ACS
410 S. Colfax
Griffith, Indiana

FILE NO. 6783
DATE 9-19-02
REF. NO. 3

Merriville Source Duplicate Sample

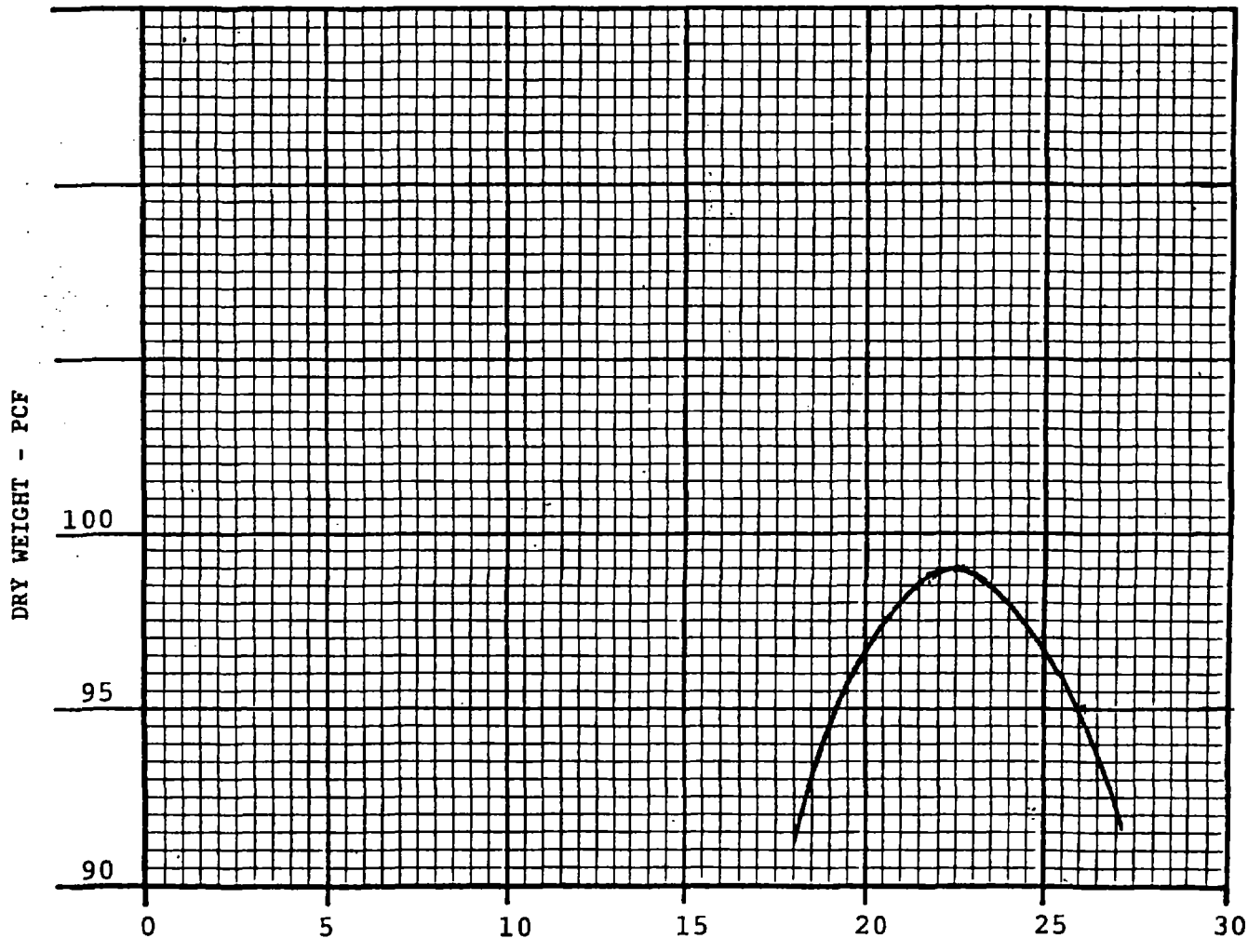
SOURCE OF MATERIAL Merrillville (2nd sample)

CLASSIFICATION OF MATERIAL Dark gray, black sandy Clay (Topsoil)

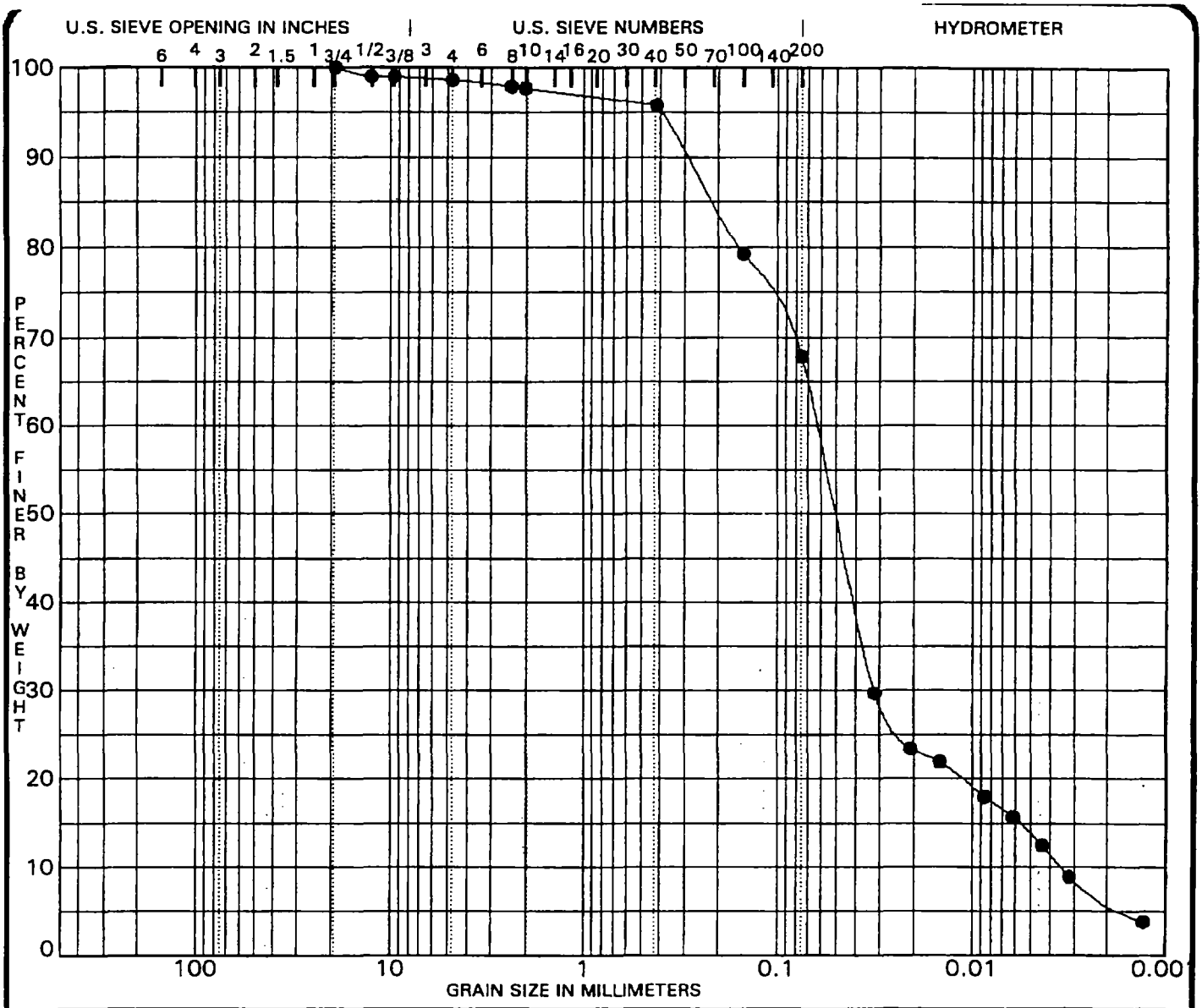
METHOD OF COMPACTION Standard Proctor ASTM D 698, Method A

HAMMER WEIGHT 5.5 LBS. FALL 12.0 IN NO. OF LAYERS 3

MOLD SIZE 4.0 INCHES MAX. DENSITY 99.0 PCF OPT. MOISTURE 22.5 %



2c: Client



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
● GRIFFITH 0.0	SANDY LEAN CLAY CL		31	20	11		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● GRIFFITH 0.0	19.00	0.06	0.032	0.0035	1.4	30.8	54.1	13.7

PROJECT ACS - 410 S Colfax, Griffith, IN

JOB NO. 6783
DATE 09/23/02

GRADATION CURVES

K & S TESTING AND ENGINEERING INC.

Figure 6

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland IN 46322 (219) 924-5231

Figure 7

REPORT ON

MOISTURE – DENSITY RELATIONSHIP

CLIENT: Environmental Contractors of Illinois, Inc. (ECI)
5290 Nimtz Road
P.O. Box 2071
Loves Park, IL 61111

PROJECT: ACS
410 S. Colfax
Griffith, Indiana

FILE NO. 6783
DATE 9-19-02
REF. NO. 4

Griffith Source

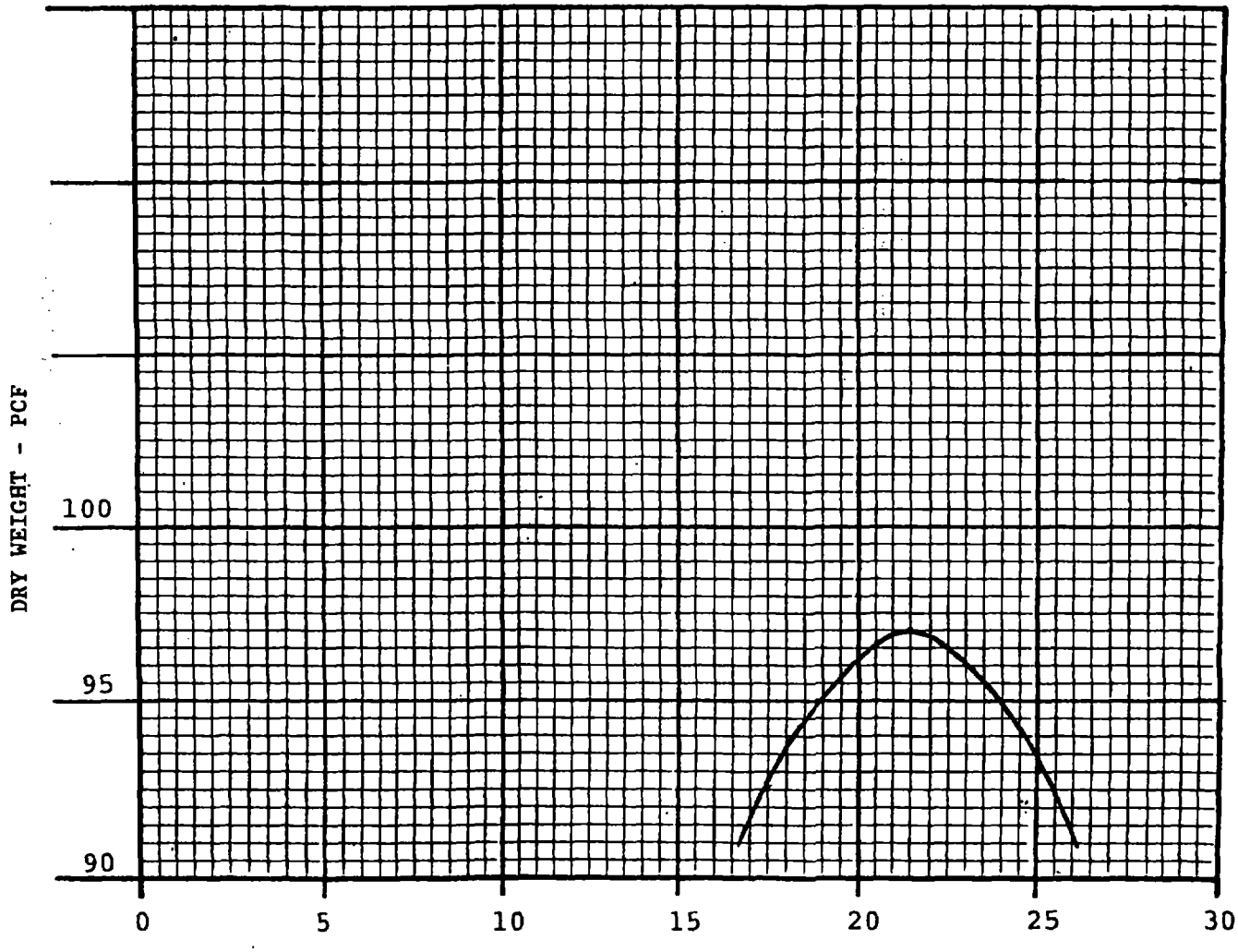
SOURCE OF MATERIAL Griffith

CLASSIFICATION OF MATERIAL Dark gray, black sandy Clay (Topsoil)

METHOD OF COMPACTION Standard Proctor ASTM D 698, Method A

HAMMER WEIGHT 5.5 LBS. FALL 12.0 IN NO. OF LAYERS 3

MOLD SIZE 4.0 INCHES MAX. DENSITY 97.0 PCF OPT. MOISTURE 21.5 %



2c: Client

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland IN 46322 (219) 924-5231

Figure 8

REPORT ON

MOISTURE – DENSITY RELATIONSHIP

CLIENT: Environmental Contractors of Illinois, Inc. (ECI)
5290 Nimtz Road
P.O. Box 2071
Loves Park, IL 61111
Attn: Mr. Randy Price

PROJECT: ACS
410 S. Colfax
Griffith, Indiana

FILE NO. 6783
DATE 9-25-02
REF. NO. 5

Griffith Source Duplicate Sample

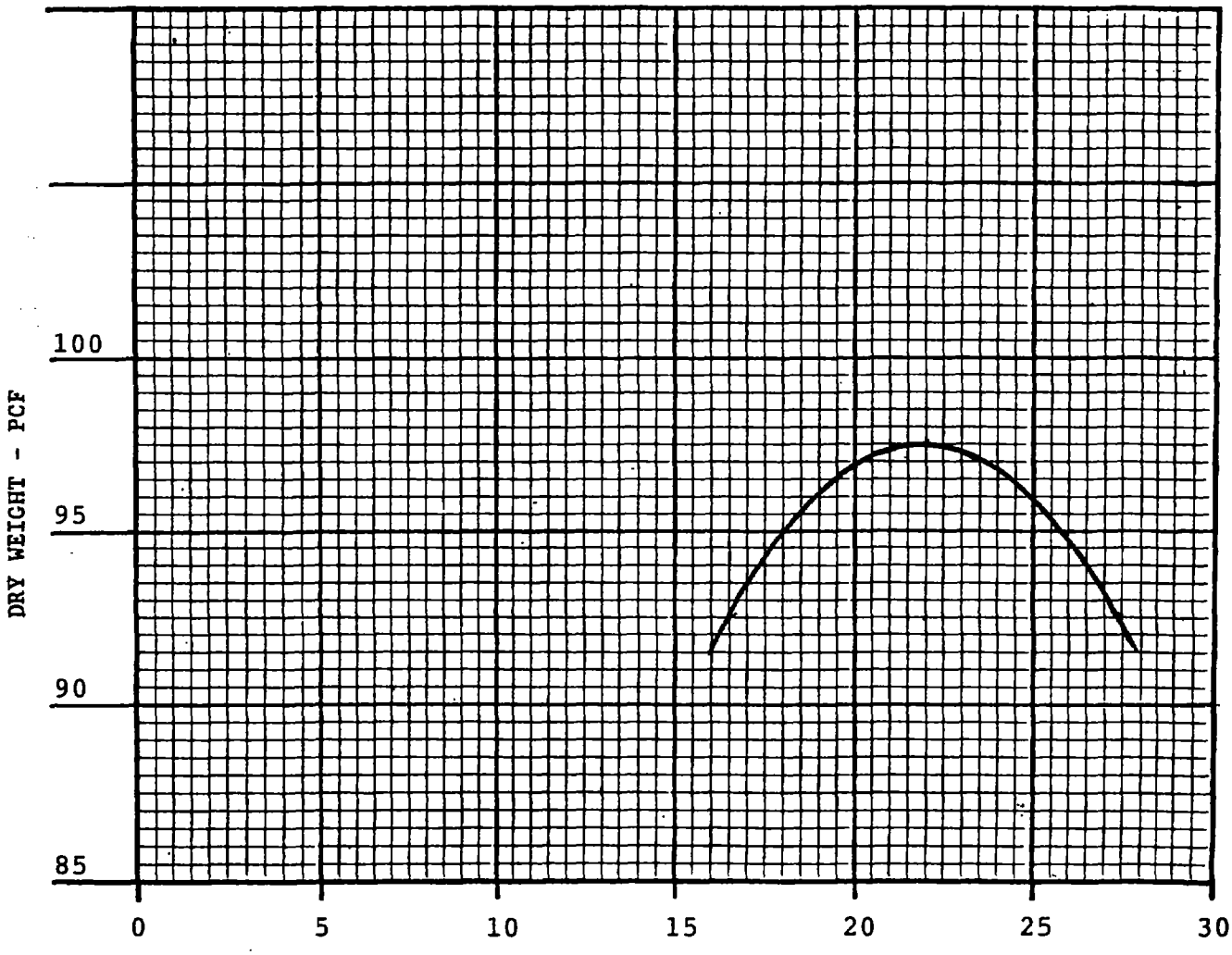
SOURCE OF MATERIAL Borrow

CLASSIFICATION OF MATERIAL Black, dark gray silty Clay Top Soil

METHOD OF COMPACTION Standard Proctor ASTM D 698, Method A

HAMMER WEIGHT 5.5 LBS. FALL 12.0 IN NO. OF LAYERS 3

MOLD SIZE 4.0 INCHES MAX. DENSITY 97.5 PCF OPT. MOISTURE 22.0 %



2c: Client

APPENDIX I

Compaction and Moisture Testing Results of Root Zone Material (K&S)

- **Nuclear Density Testing Results**
- **Sand Cone Method Testing Results**

- **Nuclear Density Testing Results**

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-10-02 REPORT NO. 2A SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION	
STONE		MOIST	FROZEN	VIBRATING PLATE	X
SAND	X	DAMP X	SOFT	VIBRATING ROLLER	X
CLAY		WET	LOOSE	SHEEPS FOOT ROLLER	
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER	

LABORATORY DATA AND PROCEDURES		FIELD TEST METHOD	
ASTM D 1557 - 91	METHOD	ASTM D 1556 - 90	
ASTM D 698 - 91 X	METHOD A	ASTM D 3017 - 93	X
PROJECT SPECIFICATIONS		OTHER	
REFERENCE TEST No.: 1	Wetland Sand Material	SPECIFICATON REQUIREMENTS	
MAXIMUM DENSITY PCF 109.0		90.0	% MAXIMUM DENSITY
OPTIMUM MOISTURE% 11.0			% RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPAC-TION %	PASS OR FAIL	LOCATION OF TEST
							SOUTH EAST AREA (PRACTICE)
9-10	1	1	101.0	11.2	92.6	P	4.0"
9-10	1	1A	103.9	11.0	95.3	P	8.0"
9-10	1	2	101.7	13.0	93.3	P	4.0"
9-10	1	2A	101.8	13.0	93.3	P	8.0"
9-10	1	3	106.1	11.2	97.7	P	4.0"
9-10	1	3A	109.5	11.2	100+	P	8.0"
9-10	1	4	106.0	11.6	92.3	P	4.0"
9-10	1	4A	102.5	10.1	94.0	P	8.0"

c: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT: Environmental Contractors of Illinois, Inc, (ECI)
5290 Nimtz Road
P.O. Box 2071
Loves Park, IL 61111

Attn: Mr. Randy Price

PROJECT: ACS
410 S. Colfax
Griffith, Indiana

FILE NO. 6783
DATE: 9-10-02
REPORT NO. 2B
SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION	
STONE		MOIST	FROZEN	VIBRATING PLATE	
SAND	X	DAMP X	SOFT	VIBRATING ROLLER	X
CLAY		WET	LOOSE	SHEEPS FOOT ROLLER	
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER	

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____
ASTM D 698 - 91 X METHOD A
PROJECT SPECIFICATIONS _____
REFERENCE TEST No.: 1 Wetland Sand Material
MAXIMUM DENSITY PCF 109.0
OPTIMUM MOISTURE% 11.0

FIELD TEST METHOD

ASTM D 1556 - 90 _____
ASTM D 3017 - 93 X
OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY
_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPAC-TION %	PASS OR FAIL	LOCATION OF TEST
							SOUTH EAST AREA
9-10	1	1	102.0	10.8	93.6		TEST NO. 1
9-10	1	2	NOT TO BE RECORDED				TEST NO. 2
9-10	1	3	107.6	11.9	98.7		TEST NO. 3
9-10	1	4	102.3	12.1	93.9		TEST NO. 4

c: Client

SEP 18 2002

K & S Engineers, Inc.

9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-11-02 REPORT NO. 3 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND	X	DAMP	SOFT	VIBRATING ROLLER
CLAY		WET X	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES	FIELD TEST METHOD
ASTM D 1557 - 91 ____ METHOD ____	ASTM D 1556 - 90 ____
ASTM D 698 - 91 X METHOD A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS ____	OTHER ____
REFERENCE TEST No.: 1 Wetland Sand Material	SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF 109.0	____ % MAXIMUM DENSITY
OPTIMUM MOISTURE% 11.0	____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-11	1	1	110.3	12.5	100+		LOCATION #2
9-11	1	2	109.1	13.4	100+		LOCATION #5
9-11	1	3	111.3	13.6	10)+		LOCATION #7
9-11	1	4	116.2	14.0	100+		LOCATION #6
9-11	1	5	110.0	10.0	100+		LOCATION #8

c: Client

SEP 18 2002

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322. Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-12-02 REPORT NO. 4 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND	X	DAMP	SOFT	VIBRATING ROLLER
CLAY		WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY X	FIRM	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____

ASTM D 698 - 91 X METHOD A

PROJECT SPECIFICATIONS _____

REFERENCE TEST No.: 1 Wetland Sand Material

MAXIMUM DENSITY PCF 109.0

OPTIMUM MOISTURE% 11.0

FIELD TEST METHOD

ASTM D 1556 - 90 _____

ASTM D 3017 - 93 X

OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY

_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-12	1	1	115.9	4.9	100+		LOCATION #5
9-12	1	2	117.7	5.4	100+		LOCATION #5
9-12	1	3	107.3	8.5	98.4		LOCATION #7
9-12	1	4	119.5	6.8	100+		LOCATION #6
9-12	1	5	114.5	8.4	100+		LOCATION #9
9-12	1	6	110.4	9.1	100+		LOCATION #10
9-12	1	7	115.9	6.2	100+		LOCATION #11
9-12	1	8	116.7	7.7	100+		LOCATION #12
9-12	1	9	113.0	6.4	100+		LOCATION #13
9-12	1	10	115.9	5.1	100+		LOCATION #14
9-12	1	11	117.1	4.9	100+		LOCATION #15
9-12	1	12	116.4	4.0	100+		LOCATION #16

c: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

SEP 1 8

CLIENT	Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	PROJECT	ACS 410 S. Colfax Griffith, Indiana

FILE NO. 6783
DATE: 9-13-02
REPORT NO. 5
SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND	X	DAMP	SOFT	VIBRATING ROLLER
CLAY		WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____
ASTM D 698 - 91 X METHOD A
PROJECT SPECIFICATIONS _____
REFERENCE TEST No.: 1 Wetland Sand Material
MAXIMUM DENSITY PCF 109.0
OPTIMUM MOISTURE% 11.0

FIELD TEST METHOD

ASTM D 1556 - 90 _____
ASTM D 3017 - 93 X
OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY
_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-13	1	1	115.7	8.0	100+		LOCATION #2
9-13	1	2	115.8	8.8	100+		LOCATION #5
9-13	1	3	119.7	6.4	100+		LOCATION #7
9-13	1	4	122.1	6.2	100+		LOCATION #6
9-13	1	5	113.8	7.9	100+		LOCATION #8

c: Client

K & S Engineers, Inc.

9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-16-02 REPORT NO. 6 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP	SOFT	VIBRATING ROLLER
CLAY	X	WET X	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____

ASTM D 698 - 91 X METHOD A

PROJECT SPECIFICATIONS _____

REFERENCE TEST No.: 2 Merriville Source Material

MAXIMUM DENSITY PCF 107.5

OPTIMUM MOISTURE% 17.5

FIELD TEST METHOD

ASTM D 1556 - 90 _____

ASTM D 3017 - 93 X

OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY

_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPAC-TION %	PASS OR FAIL	LOCATION OF TEST
9-16	2	1	92.6	18.8	86.1		LOCATION #17
9-16	2	2	94.7	15.3	88.1		RETEST OF TEST #17
9-16	2	3	96.9	17.7	90.1		LOCATION #18
9-16	2	4	89.4	17.9	83.2		LOCATION #19
9-16	2	5	94.7	18.3	88.1		LOCATION #20
9-16	2	6	87.9	20.5	81.9		LOCATION #21
9-16	2	7	89.0	20.8	82.8		LOCATION #21
9-16	2	8	95.2	17.9	88.6		RETEST OF LOCATION #20
9-16	2	9	90.7	17.8	84.4		RETEST OF LOCATION #19
9-16	2	10	89.9	19.7	83.6		RETEST OF LOCATION #19
9-16	2	11	91.2	24.3	84.8		RETEST OF LOCATION #21
9-16	2	12	90.0	19.3	83.7		RETEST OF LOCATION #21
9-16	2	13	92.6	17.1	86.1		RETEST OF LOCATION #17

2c: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-17-02 REPORT NO. 7 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION	
STONE		MOIST		VIBRATING PLATE	
SAND		DAMP	X	VIBRATING ROLLER	X
CLAY	X	WET		SHEEPS FOOT ROLLER	
SLAG		DRY		RUBBER TIRE ROLLER	
				FIRM	X

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____
ASTM D 698 - 91 X METHOD A
PROJECT SPECIFICATIONS _____
REFERENCE TEST No.: 2 Merriville Source Material
MAXIMUM DENSITY PCF 107.5
OPTIMUM MOISTURE% 17.5

FIELD TEST METHOD

ASTM D 1556 - 90 _____
ASTM D 3017 - 93 X
OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY
_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-17	2	1	95.1	22.6	88.4		OFF SITE - LANDFILL TEST NO. 22
9-17	2	2	87.1	26.4	81.0		TEST NO. 23
9-17	2	3	91.7	22.3	85.3		TEST NO. 24
9-17	2	4	99.6	20.7	92.6		TEST NO. 25

c: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-24-02 REPORT NO. 8 SHEET 1 OF 2

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND	X	DAMP X	SOFT	VIBRATING ROLLER
CLAY		WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____
ASTM D 698 - 91 X METHOD A
PROJECT SPECIFICATIONS _____
REFERENCE TEST No.: 2 Merriville Source Material
MAXIMUM DENSITY PCF 107.5
OPTIMUM MOISTURE% 17.5

FIELD TEST METHOD

ASTM D 1556 - 90 _____
ASTM D 3017 - 93 X
OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY
_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-24	2	1	91.7	21.5	85.3		TEST NO. 22 - RETEST
9-24	2	2	97.3	21.1	90.5		TEST NO. 23 - RETEST
9-24	2	3	93.4	20.8	86.9		TEST NO. 24 - RETEST
9-24	2	4	96.1	18.2	89.4		TEST NO. 25 - RETEST
9-24	2	5	92.0	18.2	85.6		TEST NO. 26
9-24	2	6	87.3	17.5	81.2		TEST NO. 27
9-24	2	7	99.4	18.1	92.5		TEST NO. 28
9-24	2	8	92.3	18.2	85.9		TEST NO. 29
9-24	2	9	94.3	20.0	87.7		TEST NO. 30
9-24	2	10	94.5	15.7	87.9		TEST NO. 31
9-24	2	11	92.9	17.5	86.5		TEST NO. 32
9-24	2	12	93.3	17.5	86.8		TEST NO. 33
9-24	2	13	105.2	16.5	97.9		TEST NO. 34
9-24	2	14	98.7	15.2	91.8		RETEST OF TEST NO. 34
9-24	2	15	87.3	15.6	81.2		TEST NO. 35

c: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	PROJECT	ACS 410 S. Colfax Griffith, Indiana

FILE NO. 6783
DATE: 9-24-02
REPORT NO. 8
SHEET 2 OF 2

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP X	SOFT	VIBRATING ROLLER
CLAY	X	WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES	FIELD TEST METHOD
ASTM D 1557 - 91 ____ METHOD ____	ASTM D 1556 - 90 ____
ASTM D 698 - 91 X METHOD A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS ____	OTHER ____
REFERENCE TEST No.: 4 Griffith Source Material	SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF 97.0	____ % MAXIMUM DENSITY
OPTIMUM MOISTURE% 22.0	____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-24	4	16	87.0	21.2	89.6		TEST NO. 36
9-24	4	17	95.4	16.9	98.3		TEST NO. 37
9-24	4	18	86.3	13.8	88.9		TEST NO. 38
9-24	4	19	87.0	14.7	89.6		TEST NO. 39

2c: Client

K & S Engineers, Inc.
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OCT 07 2002

FIELD COMPACTION TEST

CLIENT	Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	PROJECT	ACS 410 S. Colfax Griffith, Indiana

FILE NO. 6783
DATE: 9-26-02
REPORT NO. 9
SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP	SOFT	VIBRATING ROLLER
CLAY	X	WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES				FIELD TEST METHOD
	Wetland Sand Material	Merriville Source Material	Griffith Source Material	
ASTM D 1557 - 91		METHOD		ASTM D 1556 - 90
ASTM D 698 - 91	X	METHOD	A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS				OTHER
REFERENCE TEST No.:	1	2	4	SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF	109.0	107.5	97.0	% MAXIMUM DENSITY
OPTIMUM MOISTURE%	11.0	17.5	21.5	% RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
-26	2	1	97.9	19.0	91.1		RETEST OF TEST #22
9-26	2	2	95.4	17.7	88.8		RETEST OF TEST #25
-26	2	3	96.1	21.2	89.4		RETEST OF TEST #23
9-26	2	4	99.0	18.0	92.1		RETEST OF TEST #24
-26	2	5	95.7	17.6	89.0		RETEST OF TEST #30
9-26	1	6	102.0	11.9	93.6		RETEST OF TEST #34
-26	4	7	91.8	23.4	94.6		RETEST OF TEST #37
-26	4	8	88.4	20.2	91.1		TEST #42

: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-27-02 REPORT NO. 10 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP X	SOFT	VIBRATING ROLLER
CLAY	X	WET	LOOSE	SHEEP$ FOOT ROLLER
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 _____ METHOD _____
ASTM D 698 - 91 X METHOD A
PROJECT SPECIFICATIONS _____
REFERENCE TEST No.: 4 Griffith Source Material
MAXIMUM DENSITY PCF 97.0
OPTIMUM MOISTURE% 21.5

FIELD TEST METHOD

ASTM D 1556 - 90 _____
ASTM D 3017 - 93 X
OTHER _____

SPECIFICATON REQUIREMENTS

_____ % MAXIMUM DENSITY
_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPAC-TION %	PASS OR FAIL	LOCATION OF TEST
)-27	4	1	90.7	13.1	93.5		TEST #41
9-27	4	2	98.0	11.7	100+		TEST #48
)-27	4	3	90.7	19.8	93.5		TEST #49
9-27	2	4	86.9	17.7	80.8		RETEST OF TEST #23

2 : Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-30-02 REPORT NO. 11 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP X	SOFT	VIBRATING ROLLER
CLAY	X	WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES	FIELD TEST METHOD
ASTM D 1557 - 91 _____ METHOD _____	ASTM D 1556 - 90 _____
ASTM D 698 - 91 X METHOD A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS _____	OTHER _____
REFERENCE TEST No.: 4 Griffith Source Material	SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF 97.0	_____ % MAXIMUM DENSITY
OPTIMUM MOISTURE% 21.5	_____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-30	4	1	92.8	20.4	95.6		TEST #38
9-30	4	2	90.6	20.3	93.4		TEST #37
9-30	4	3	85.3	19.8	87.9		TEST #36
9-30	4	4	92.6	22.0	95.4		TEST #43
9-30	4	5	78.8	21.1	81.2		TEST #46
9-30	4	6	88.8	20.2	97.5		TEST #54
9-30	4	7	83.0	20.1	85.5		TEST #53

2 : Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 9-30-02 REPORT NO. 12 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP X	SOFT	VIBRATING ROLLER
CLAY	X	WET	LOOSE	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM X	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES	FIELD TEST METHOD
ASTM D 1557 - 91 ____ METHOD ____	ASTM D 1556 - 90 ____
ASTM D 698 - 91 X METHOD A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS ____	OTHER ____
REFERENCE TEST No.: 4 Griffith Source Material	SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF 97.0	____ % MAXIMUM DENSITY
OPTIMUM MOISTURE% 21.5	____ % RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
9-30	4	1	89.1	19.9	91.8		TEST #39
9-30	4	2	89.3	19.7	92.1		TEST #40
9-30	4	3	89.0	19.9	91.7		TEST #41
9-30	4	4	78.0	21.0	80.4		TEST #48
9-30	4	5	78.3	21.8	80.7		TEST #49
9-30	4	6	87.1	20.6	89.7		TEST #50
9-30	4	7	82.0	21.1	84.5		TEST #42

C: Client

K & S Engineers, Inc.
9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

Environmental Contractors of Illinois, Inc, (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	PROJECT	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE: 10-1-02 REPORT NO. 13 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE		METHOD OF COMPACTION
STONE		MOIST	FROZEN	VIBRATING PLATE
SAND		DAMP	SOFT	VIBRATING ROLLER
CLAY	X	WET X	LOOSE X	SHEEPS FOOT ROLLER
SLAG		DRY	FIRM	RUBBER TIRE ROLLER

LABORATORY DATA AND PROCEDURES		FIELD TEST METHOD
ASTM D 1557 - 91	METHOD	ASTM D 1556 - 90
STM D 698 - 91 X	METHOD A	ASTM D 3017 - 93 X
PROJECT SPECIFICATIONS		OTHER
REFERENCE TEST No.: 4 Griffith Source Material		SPECIFICATON REQUIREMENTS
MAXIMUM DENSITY PCF 97.0		% MAXIMUM DENSITY
OPTIMUM MOISTURE% 21.5		% RELATIVE DENSITY

DATE	REF. No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION %	PASS OR FAIL	LOCATION OF TEST
10-1	4	1	90.4	23.3	93.1		TEST #35
10-1	4	2	92.1	23.4	97.4		TEST #45
10-1	4	3	84.3	22.0	87.0		TEST #44
10-1	4	4	92.2	23.5	95.0		TEST #56
10-1	4	5	94.2	21.6	97.1		TEST #52
10-1	4	6	86.1	23.2	88.7		TEST #51
10-1	4	7	78.8	21.7	81.2		TEST #47

: Client

- **Sand Cone Method Testing Results**

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland, IN 46322
(219)924-5231 • (773)734-5900 • Fax (219)924-5271

DATA SHEET
FIELD COMPACTION TESTS

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc. (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE 9-24-02 SHEET 1 OF 1 REPORT NO. 1 INSPECTOR Rajesh Malik

TYPE OF FILL		CONDITION OF GRADE				METHOD OF COMPACTION	
STONE		DRY		FROZEN		VIBRATING ROLLER	
SAND	X	DAMP	X	SOFT		VIBRATING PLATE	
CLAY		MOIST		LOOSE	X	SHEEPSFOOT ROLLER	
SLAG		WET		FIRM		RUBBER TIRE ROLLER	

	TEST NUMBERS			
1	WT. OF SAND + CONT. BEFORE TEST (LBS)	13.41		
2	WT. OF SAND + CONT. AFTER TEST (LBS)	6.33		
3	WT. OF SAND - (1) - (2) (LBS)	7.08		
4	WT. OF SAND TO FILL CONE (LBS)	3.83		
5	WT. OF SAND TO FILL HOLE (3) - (4) (LBS)	3.25		
6	WT. OF EXCAVATED SOIL + CONT. (LBS)	3.85		
7	WT. OF CONTAINER (LBS)	.61		
8	WT. OF EXCAVATED SOIL (6) - (7)	3.24		
9	DENSITY OF CONTROL SAND (PCF)	96.2		
10	WET DENSITY OF SOIL (8) X (9)/(5) (PCF)	95.9		
10A	TIN NO.	KS-27		
11	WET WT. OF SAMPLE + TIN (GMS)	142.27		
12	DRY WT. OF SAMPLE + TIN (GMS)	134.57		
13	WT. OF WATER (11) - (12) (GMS)	7.7		
14	WT. OF TIN (GMS)	31.08		
15	DRY WT. OF SOIL (12) - (14) (GMS)	103.49		
16	MOISTURE (13) X (100)/(15) (%)	7.44		
17	DRY DENSITY (10) X 100/100 + (16) (PCF)	89.3		
18	MAXIMUM DENSITY (PCF)	109.0		
19	OPTIMUM MOISTURE (%)	11.0%		
20	REFERENCE: LAB NUMBER	#1 Wetland Sand Material		
21	COMPACTION (17) X 100/(18) (%)	81.9		
22	COMPACTION REQUIRED (%)			
23	PASS - FAIL			
24	LOCATION	#1		

REMARKS:

2c:Client

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland, IN 46322
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DATA SHEET
FIELD COMPACTION TESTS

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc. (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE 9-24-02 SHEET 1 OF 1 REPORT NO. 2 INSPECTOR RAJESH MALIK

TYPE OF FILL		CONDITION OF GRADE				METHOD OF COMPACTION	
STONE		DRY		FROZEN		VIBRATING ROLLER	
SAND		DAMP	X	SOFT		VIBRATING PLATE	
CLAY	X	MOIST		LOOSE	X	SHEEPSFOOT ROLLER	
SLAG		WET		FIRM		RUBBER TIRE ROLLER	

	TEST NUMBERS	2		
1	WT. OF SAND + CONT. BEFORE TEST (LBS)	13.35		
2	WT. OF SAND + CONT. AFTER TEST (LBS)	7.21		
3	WT. OF SAND - (1) - (2) (LBS)	6.14		
4	WT. OF SAND TO FILL CONE (LBS)	3.83		
5	WT. OF SAND TO FILL HOLE (3) - (4) (LBS)	2.31		
6	WT. OF EXCAVATED SOIL + CONT. (LBS)	3.25		
7	WT. OF CONTAINER (LBS)	.62		
8	WT. OF EXCAVATED SOIL (6) - (7)	2.63		
9	DENSITY OF CONTROL SAND (PCF)	96.2		
10	WET DENSITY OF SOIL (8) X (9)/(5) (PCF)	109.5		
10A	TIN NO.	KS-44		
11	WET WT. OF SAMPLE + TIN (GMS)	130.96		
12	DRY WT. OF SAMPLE + TIN (GMS)	115.46		
13	WT. OF WATER (11) - (12) (GMS)	15.50		
14	WT. OF TIN (GMS)	31.88		
15	DRY WT. OF SOIL (12) - (14) (GMS)	83.58		
16	MOISTURE (13) X (100)/(15) (%)	18.6		
17	DRY DENSITY (10) X 100/100 + (16) (PCF)	92.3		
18	MAXIMUM DENSITY (PCF)	107.5		
19	OPTIMUM MOISTURE (%)	17.5		
20	REFERENCE: LAB NUMBER	#2 Merriville Source Material		
21	COMPACTION (17) X 100/(18) (%)	85.9		
22	COMPACTION REQUIRED (%)			
23	PASS - FAIL			
24	LOCATION	#22		

REMARKS:

2c:Client

K & S Engineers, Inc.
9715 Kennedy Avenue - Highland, IN 46322
(219)924-5231 • (773)734-5900 • Fax (219)924-5271

DATA SHEET
FIELD COMPACTION TESTS

CLIENT	PROJECT	
Environmental Contractors of Illinois, Inc. (ECI) 5290 Nimtz Road P.O. Box 2071 Loves Park, IL 61111 Attn: Mr. Randy Price	ACS 410 S. Colfax Griffith, Indiana	FILE NO. 6783 DATE 10-1-02 SHEET 1 OF 1 REPORT NO. 3 INSPECTOR Venkat

TYPE OF FILL		CONDITION OF GRADE				METHOD OF COMPACTION	
STONE		DRY		FROZEN		VIBRATING ROLLER	
SAND		DAMP		SOFT		VIBRATING PLATE	
CLAY	X	MOIST		LOOSE		SHEEPSFOOT ROLLER	
SLAG		WET	X	FIRM.		RUBBER TIRE ROLLER	

	TEST NUMBERS			
1	WT. OF SAND + CONT. BEFORE TEST (LBS)	13.87		
2	WT. OF SAND + CONT. AFTER TEST (LBS)	8.55		
3	WT. OF SAND - (1) - (2) (LBS)	5.32		
4	WT. OF SAND TO FILL CONE (LBS)	3.80		
5	WT. OF SAND TO FILL HOLE (3) - (4) (LBS)	1.52		
6	WT. OF EXCAVATED SOIL + CONT. (LBS)	2.05		
7	WT. OF CONTAINER (LBS)	0.45		
8	WT. OF EXCAVATED SOIL (6) - (7)	1.60		
9	DENSITY OF CONTROL SAND (PCF)	96.2		
10	WET DENSITY OF SOIL (8) X (9)/(5) (PCF)	101.3		
10A	TIN NO.	KS-23		
11	WET WT. OF SAMPLE + TIN (GMS)	82.29		
12	DRY WT. OF SAMPLE + TIN (GMS)	73.50		
13	WT. OF WATER (11) - (12) (GMS)	8.79		
14	WT. OF TIN (GMS)	31.47		
15	DRY WT. OF SOIL (12) - (14) (GMS)	42.03		
16	MOISTURE (13) X (100)/(15) (%)	20.9		
17	DRY DENSITY (10) X 100/100 + (16) (PCF)	83.8		
18	MAXIMUM DENSITY (PCF)	97.0		
19	OPTIMUM MOISTURE (%)	21.5		
20	REFERENCE: LAB NUMBER	-		
21	COMPACTION (17) X 100/(18) (%)	85.9		
22	COMPACTION REQUIRED (%)			
23	PASS - FAIL			
24	LOCATION	Test No. 44		

REMARKS:

2c:Client

APPENDIX J

Air Monitoring Logs for Trench Installation Activities

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.

FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9-3-02 Temp/Wind Speed & Direction: 66°F/5-10 MPH N

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/LOCATION	WORK ZONE	H_2S	OVM	O_2	LEL	CO
8AM	DIGGING TRENCH	SOUTH TRENCH	/	0.0	/	/	/
9AM	"	"	/	0.0	/	/	/
10AM	"	"	/	0.0	/	/	/
11AM	"	"	/	0.0	/	/	/
12NOON	"	"	/	0.0	/	/	/
1PM	"	"	/	0.0	/	/	/
2PM	"	"	/	0.0	/	/	/
3PM	"	"	/	0.0	/	/	/
4PM	"	"	/	0.0	/	/	/
5PM	"	"	/	0.0	/	/	/
			/	/	/	/	/

FIELD NOTES

Complaints/Symptoms:

NONE

~~Chemicals~~/Equipment in Use:

JD 710 D

Engineering Controls:

MINI RAY 1H PID METER

PPE in Use:

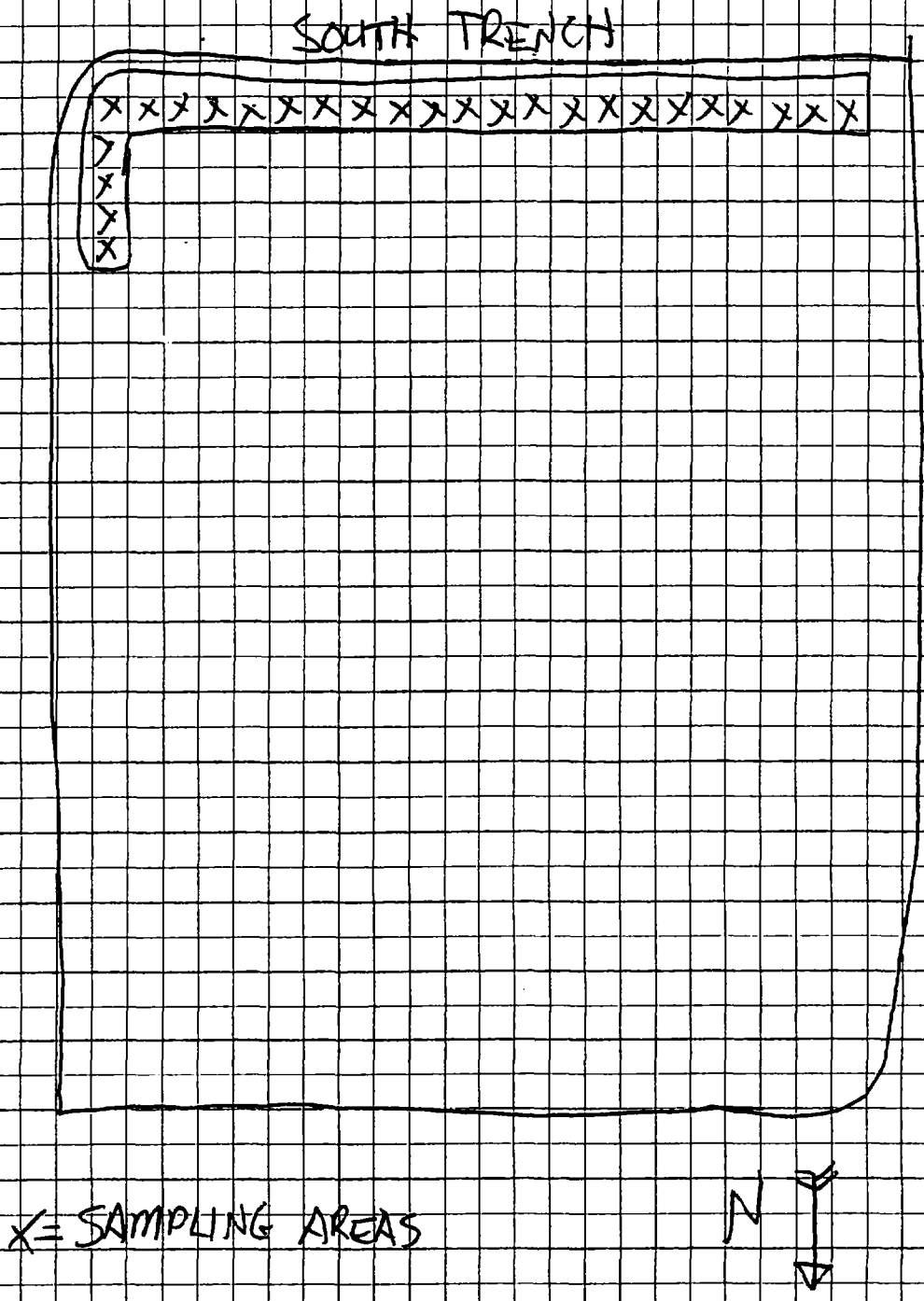
LEVEL D

Observation/Comments:

NO DETECTABLE VOC'S ALL DAY.

Analyst: RANDY PRICE

Health & Safety Officer
Environmental Contractors of Illinois, Inc.


SOUTH TRENCH
X= SAMPLING AREAS
N

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.

FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9-4-02 Temp/Wind Speed & Direction: 63°F / 5-10 MPH N

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/LOCATION	WORK ZONE	H_2S	OVM	O_2	LEL	CO
8AM	DIGGING TRENCH	EAST TRENCH	/	0.0	/	/	/
9AM	"	"	/	0.0	/	/	/
10AM	"	"	/	0.0	/	/	/
11AM	"	"	/	0.0	/	/	/
12NOON	"	"	/	0.0	/	/	/
1PM	"	"	/	0.0	/	/	/
2PM	"	"	/	0.0	/	/	/
3PM	"	"	/	0.0	/	/	/
4PM	"	"	/	0.0	/	/	/
5PM	"	"	/	0.0	/	/	/
			/	/	/	/	/

FIELD NOTES

Complaints/Symptoms:

NONE

~~Chemicals~~/Equipment in Use:

JD 710 D

Engineering Controls:

MINI RAY 1H PID METER

PPE in Use:

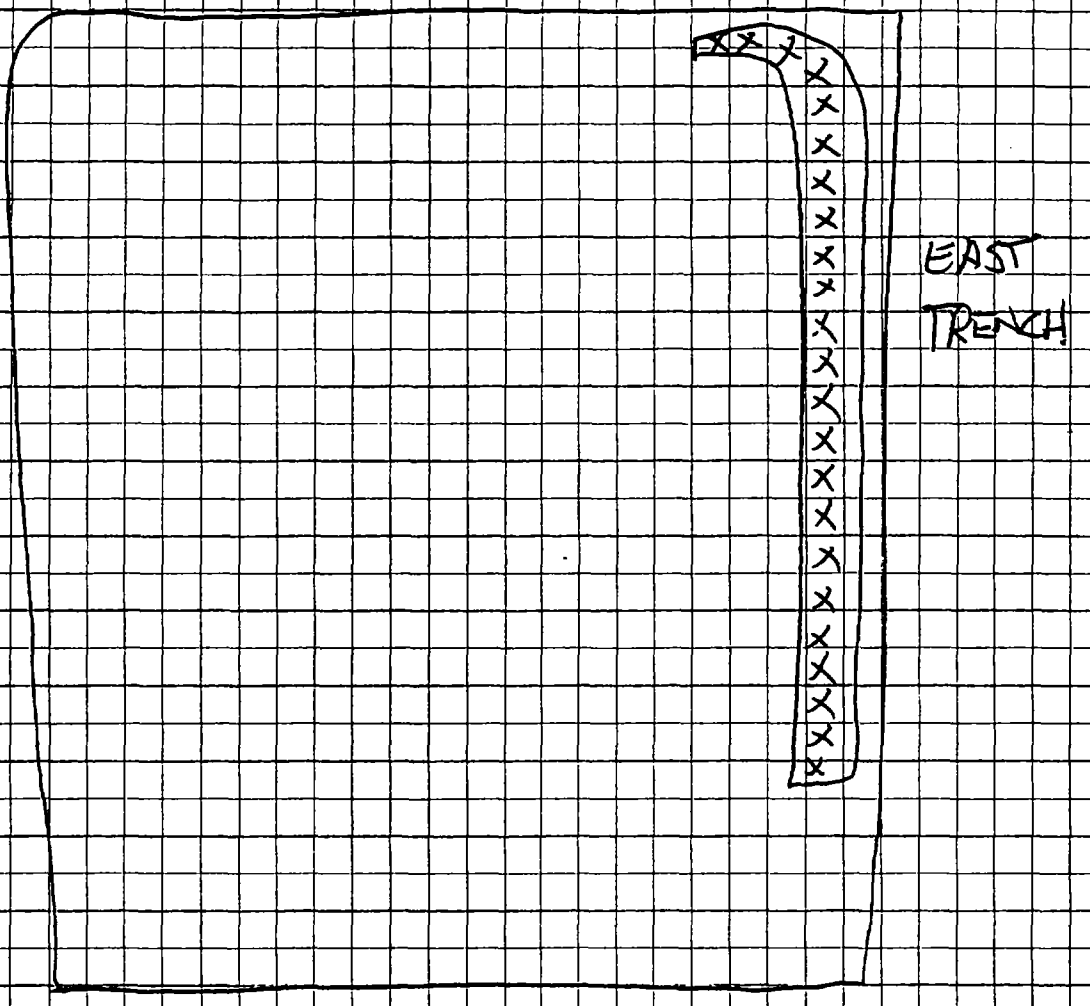
LEVEL D

Observation/Comments:

NO DETECTABLE VOC'S ALL DAY.

Analyst: RANDY PRICE

Health & Safety Officer
Environmental Contractors of Illinois, Inc.



X= SAMPLING AREAS

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.

FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9-5-02 Temp/Wind Speed & Direction: 65°F/5-15 MPH

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/LOCATION	WORK ZONE	H2S	OVM	O2	LEL	CO
8AM	DIGGING TRENCH	W. TRENCH	/	0.0	/	/	/
9AM			/	0.0	/	/	/
10AM			/	0.0	/	/	/
11AM			/	0.0	/	/	/
12 NOON			/	0.0	/	/	/
1PM	/ / / / /		/	/	/	/	/
2PM			/	/	/	/	/
3PM		EAST TRENCH	/	0.0	/	/	/
4PM			/	0.0	/	/	/
5PM			/	0.0	/	/	/
			/	/	/	/	/

FIELD NOTES

Complaints/Symptoms:

NONE

Chemicals/Equipment in Use:

SD 710D

Engineering Controls:

MINI RAE IN PID METER

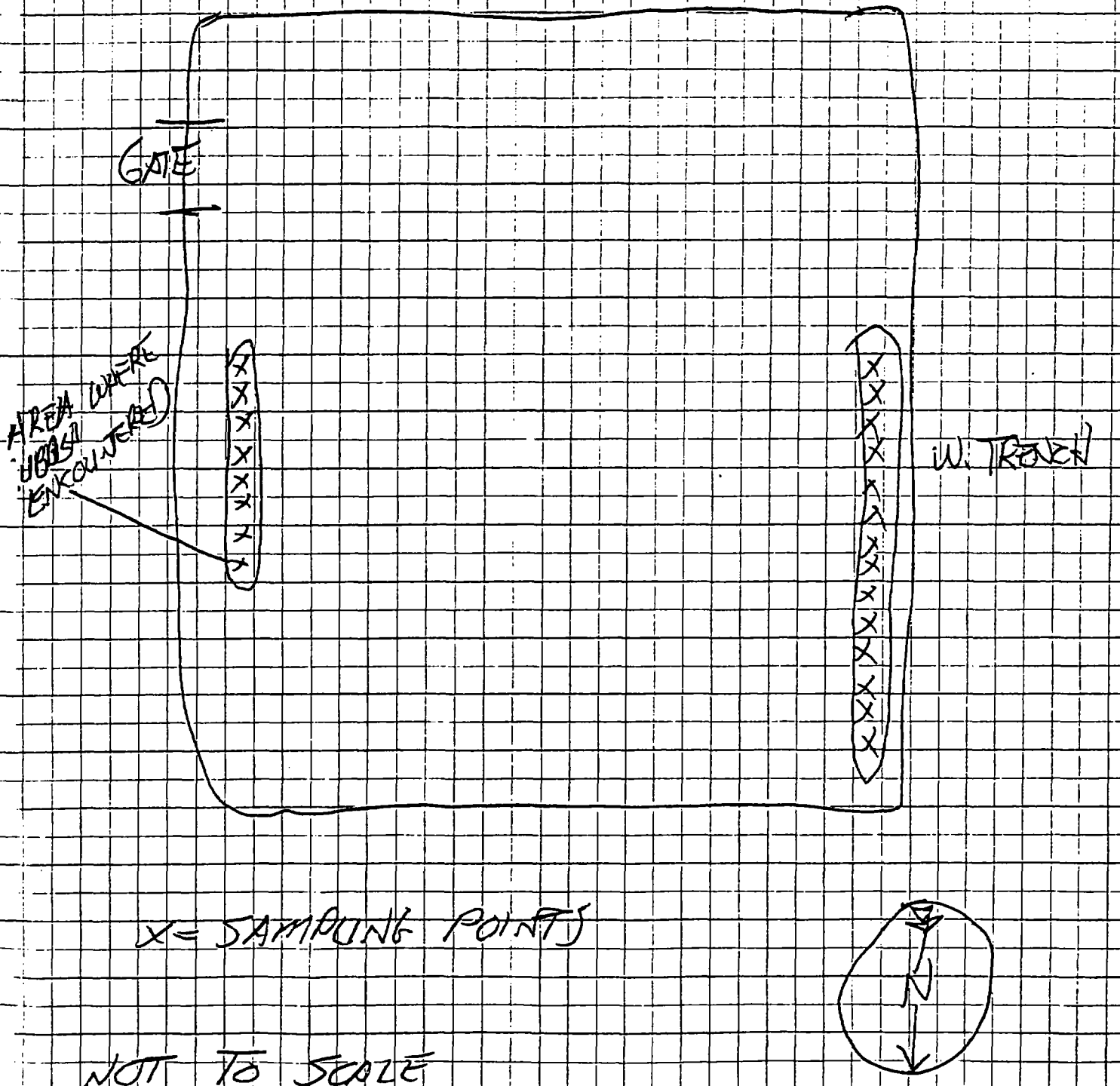
PPE in Use:

LEVEL D

Observation/Comments:

AT 4:40 PM ON THE EAST TRENCH ABOUT 1/3 THE WAY FROM THE SOUTH WE HIT A PILE OF RUBBISH THAT HAD A SOLVENT SMELL. I CHECKED THE TRENCH WITH THE PID & HAD NO READINGS. WHEN I CHECKED THE RUBBISH PILE I GOT 0.2-0.6 ppm READINGS I CHECKED EC'S BREATHING ZONE & DID NOT GET ANY READINGS.

Analyst: RANDY PRICE
Health & Safety Officer
Environmental Contractors of Illinois, Inc.



X = SAMPLING POINTS

NOT TO SCALE

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.
NICOR - FREEPORT IL – JOB #15503
FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9-6-02 Temp/Wind Speed & Direction: 65°-90° sunny no wind

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/LOCATION	WORK ZONE	H2S	OVM	O2	LEL	CO
7.30	Digging trench	East trench	/	0/0	/	/	/
8 30			/	0/0	/	/	/
9 30			/	0/0	/	/	/
10 30			/	0/0	/	/	/
11 30			/	0/0	/	/	/
1 00			/	0/0	/	/	/
2 00		North trench	/	0/0	/	/	/
3 00			/	0/0	/	/	/
4 00			/	0/0	/	/	/
5 00			/	0/0	/	/	/
6 00			/	0/0	/	/	/

FIELD NOTES

Complaints/Symptoms:

None

Chemicals/Equipment in Use:

I.D. 710 D mini RAE.

Engineering Controls:

Mini RAE PID Meter

PPE in Use:

Level D.

Observation/Comments: Around 8 AM we hit Debris in trench about 10 Ft long. From around 1:45 - 2:45 we hit concrete. From 4-6 we hit concrete and building demo debris also tires. I also monitored the cab of machine for 15 min. no hits

Analyst: Steve Palmer

Health & Safety Officer
Environmental Contractors of Illinois, Inc.

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.
NICOR - FREEPORT IL – JOB #15503
FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9-7-02 Temp/Wind Speed & Direction: 70°-90° No wind

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/LOCATION	WORK ZONE	H2S	OVM	O2	LEL	CO
730	Digging Anchor	North side	/	0/0	/	/	/
745	trench		/	0/0	/	/	/
800			/	0/0	/	/	/
830			/	0/0	/	/	/
845			/	0/0	/	/	/
900			/	0/0	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/

FIELD NOTES

Complaints/Symptoms:

None

Chemicals/Equipment in Use:

JD 710 D

Engineering Controls:

mini Rae Pid meter

PPE in Use:

Level D

Observation/Comments: not any hits. No problems at all.

Analyst: Steven Pelmer

Health & Safety Officer
Environmental Contractors of Illinois, Inc.

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.
NICOR - FREEPORT IL – JOB #15503
FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9-9-02 Temp/Wind Speed & Direction: 9-9-02

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/LOCATION	WORK ZONE	H_2S	O.V.M.	O_2	LEL	CO
7 00	Anchor trench	North end	0'	0'0	/	/	/
7 15		roadway	/	0'0	/	/	/
7 30			/	0'0	/	/	/
7 45			/	0'0	/	/	/
8 00			/	0'0	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/

FIELD NOTES

Complaints/Symptoms:

None

Chemicals/Equipment in Use:

7100 TD

Engineering Controls:

mini Rae PID

PPE in Use:

Level D

Observation/Comments:

No Hits.

Digging where we left a 15' road onto site

Analyst: Steve Pelm

Health & Safety Officer
Environmental Contractors of Illinois, Inc.

ENVIRONMENTAL CONTRACTORS OF ILLINOIS, INC.

FUGITIVE AIR EMISSIONS MONITORING LOG

Date: 9/27/02 Temp/Wind Speed & Direction: _____

			DIRECT READING/DOWNWIND				
TIME	WORK OPERATION/ LOCATION	WORK ZONE	H_2S	OVM	O2	LEL	CO
10:00 am	Repair well / check liner		0 / 0	0 / 0	21 / 0	0 / 0	0 / 0
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/
			/	/	/	/	/

FIELD NOTES

Complaints/Symptoms:

Chemicals/Equipment in Use:

Engineering Controls:

PPE in Use:

Observation/Comments:

Analyst: Steve Palmer

Health & Safety Officer
Environmental Contractors of Illinois, Inc.

APPENDIX K

Manufacturer/Supplier Specification Sheets

LINQ INDUSTRIAL FABRICS, INC.

GEOTEXTILE DIVISION
2550 WEST FIFTH NORTH STREET
SUMMERVILLE
SOUTH CAROLINA 29483-9669
GEOTEXTILE QA LINE: 1-800-543-9966
FAX: 1-843-875-8276
WEBSITE: www.linqind.com
E-MAIL: linq@linqind.com

August 22, 2002

Dear Sir or Madam:

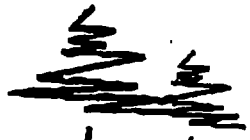
This letter is to certify that Style 350EX, a nonwoven polypropylene fabric supplied by LINQ Industrial Fabrics, Inc., meets the fabric properties listed below:

PROPERTY	*TEST PROCEDURE*	*METRIC*		*ENGLISH*	
		MARV		MARV	
Grab Tensile Strength	ASTM D-4632	1690	N	380	lbs
Grab Elongation	ASTM D-4632	50	%	50	%
Trapezoid Tear	ASTM D-4533	645	N	145	lbs
Puncture	ASTM D-4833	1068	N	240	lbs
Mullen Burst	ASTM D-3786	5512	kPa	800	psi
Permittivity	ASTM D-4491	0.5	sec^{-1}	0.5	sec^{-1}
Permeability	ASTM D-4491	0.25	cm/sec	0.25	cm/sec
A.O.S.	ASTM D-4751	0.150	mm	100	U.S. Sieve
UV Resistance (500 hrs)	ASTM D-4355	70	%	70	%
Water Flow Rate	ASTM D-4491	1428	lpm/m^2	35	gpm/ft^2

MARV: Minimum Average Roll Value

Sincerely,

Jay Wilson
Technical Services Engineer



Cooling Landscape Contractors
P.O. Box 506 • Cherry Valley, IL 61016 • Phone: 815.332.2380 • Fax: 815.332.3130

October 11, 2002

Environmental Contractors of IL
Attn: Daryl Streed
5290 Nimtz Road
Loves Park, IL 61111

Re: American Chemical Service Seed

Daryl:

The special seed mix that was required for the above referenced project was applied at a rate of 225 lbs per acre. The seed mixture specs are also included with this letter.

If you have any questions, please feel free to call me at 815-332-2144.

Sincerely,

Chris Cooling
Cooling Landscape Contractors, LLC.

Olds Seed Solutions™

Seeds for Growing Success

SUMMARY OF SEED ANALYSIS REPORTS

The Following Seed Lots Were Supplied To: Cooling Landscape Contractors

For use in: American Chemical Mixture, Lot: CLC72

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Vibrant Perennial Ryegrass			Llyn Seed Testing		L39-0-P13	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious
99.14%	.00%	.86%	.00%	90%	2/02	No IL Noxious

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Fawn Tall Fescue			Smith Seed Service		L172-2-FF15	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious
98.76%	.20%	.84%	.20%	85%	8/02	No IL Noxious

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Jasper Creeping Red Fescue			Oregon State University		U17-0-CR1-5	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious
99.36%	.00%	.64%	.00%	85%	2/02	No IL Noxious

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious

KIND OF SEED			TESTING AGENCY		LOT OR REFERENCE NO.	
Pure Seed	Other Crop	Inert Matter	Weed Seed	Germination	Test Date	Noxious

Date: September 24, 2002

William Kunzelman

William Kunzelman, R.S.T. 022

The accuracy of the information supplied is the responsibility of the testing agencies listed.
Copies of the individual reports listed are on file.

P.O. Box 7790 • Madison, WI 53707 • 608-249-9291 • 800-356-7333 • Fax 608-249-0695
Shipping: 2901 Packers Ave • Madison, WI 53704